

CURRICULUM VITAE

BALDOMERO M. OLIVERA Distinguished Professor of Biology

Education

Univ. of the Philippines, Quezon City, PI	B.S.	1960	Chemistry
California Inst. of Technology, Pasadena, CA (with Norman Davidson)	Ph.D.	1966	Biophysical Chemistry
Stanford University, Palo Alto, CA (with I. R. Lehman)	Post-doc	1966-68	Biochemistry

Research and Professional Experience

1968-1970	Research Associate Professor of Biochemistry, Univ. Philippines Medical School, Manila, PI
1969-1970	Visiting Research Associate Professor, Kansas State University, Manhattan, KS
1970-1973	Associate Professor of Biology, University of Utah, Salt Lake City, UT
1973-1992	Professor of Biology, University of Utah
1994-1995	Founding Director, Interdepartmental Neuroscience Program, University of Utah
1992-present	Distinguished Professor of Biology, University of Utah
1998-present	Adjunct Professor, The Salk Institute, La Jolla, CA
2006-present	Howard Hughes Medical Institute Professor
2007-present	Adjunct Professor, Marine Science Institute, University of the Philippines, Diliman City, Philippines

Fellowships, Named Lectureships, National Appointments

Fulbright Scholar, 1961; Damon Runyon Fellow, 1966-68; Eli Lilly Unrestricted Research Award, 1968-70; American Cancer Society Faculty Research Award, 1975-80; Alexander Von Humboldt Foundation Senior Scientist Award, 1978; Biochemistry Study Section, National Institutes of Health, 1980-1983; *Journal of Biological Chemistry* Editorial Board, 1982-1987; Cellular and Molecular Basis of Disease Review Committee, 1982-1986; Editorial Board, *J. Toxinology-Toxin Reviews*, 1990-1993; National Advisory General Medical Sciences Council, 1989-1992; Visiting Committee, Dept. of Molecular Biology and Biochemistry, Harvard University, 1988-1995; E.E. Just Lecturer, American Society of Cell Biologists, 1996; DeWitt Stetten, Jr. Lecturer, NIGMS, 1996; Advisory Committee to the NIH Director, 1996-1999; American Association for the Advancement of Science, Council Member, 1999-2001; Burroughs-Wellcome Foundation, Toxicology Advisory Committee, 1999-2001; Lorraine Morrow Kelly Distinguished Lecturer, University of Texas, 2001; Editorial Board, *Toxicon*, 2000-present; Searle Advisory Committee, 2008-2011; Forbes Lecturer, Marine Biological Laboratory, Woods Hole, 2012.

Honors and Awards

Ten Outstanding Young Men Award, Jaycees, 1968; UP Chemical Society Outstanding Alumnus, 1982; Utah Governor's Medal for Science and Technology, 1991; Caltech Distinguished Alumni Award, 2002; Redi Award, International Society for Toxinology, 2003; Elected to the Institute of Medicine, 2006; Scientist of the Year Award, Harvard Foundation, Harvard University, 2007; Elected to the American Philosophical Society, 2007; Fellow, American Academy of Arts and Sciences, 2007; Legion of Honor of the Philippines, Grand

Officer, 2008; Elected Fellow, AAAS, 2008; D.Sc. (*Honoris causa*), University of the Philippines, 2008; Elected Member, U.S. National Academy of Science, 2009.

Specific Research Interests/Selected Publications

DNA ligase: discovery, characterization and reaction mechanism

Olivera, B.M. and I.R. Lehman (1967) Linkage of polynucleotides through phosphodiester bonds by an enzyme from *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 57:1426-33.

Olivera, B.M. and I.R. Lehman (1967) Diphosphopyridine nucleotide: A cofactor for the polynucleotide joining enzyme from *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 57:1700-04.

Olivera, B.M., Z. Hall, Y. Anraku, J.R. Chien and I.R. Lehman (1968) On the mechanism of the polynucleotide joining reaction. *Cold Spring Harbor Symp. Quant. Biol.* 33:27-34.

Discontinuous DNA *in vitro*: asymmetry of replication fork

Olivera, B.M. and F. Bonhoeffer (1972) Discontinuous DNA replication *in vitro*. I. Two sizes of DNA intermediates. *Nat. New Biol.* 240:233-35.

Olivera, B.M. and F. Bonhoeffer (1974) Replication of *Escherichia coli* requires DNA polymerase I. *Nature* 250:513-14.

Higgins, N.P., P. Manlapaz-Ramos, R.T. Gandhi and B.M. Olivera (1983) Bacteriophage Mu: A transposing replicon. *Cell* 33:623-28.

DNA enzymology

Thomas, K.R. and B.M. Olivera (1978) Processivity of DNA exonucleases. *J. Biol. Chem.* 253:424-29.

Lundquist, R.C. and B.M. Olivera (1982) Transient generation of displaced single-stranded DNA during nick translation. *Cell* 31:53-60.

Ferro, A.M., M.C. McElwain and B.M. Olivera (1984) Poly(ADP-ribosylation) of DNA topoisomerase I: A nuclear response to DNA-strand interruptions. *Cold Spring Harbor Symp. Quant. Biol.* 49:683-90.

Nucleic acids: biophysical properties

Olivera, B.M., P. Baine and N. Davidson (1964) Electrophoresis of the nucleic acids. *Biopolymers* 1:245-57.

Wang, J.C., D. Baumgarten and B.M. Olivera (1967) On the origin of tertiary turns in covalently closed double-stranded cyclic DNA. *Proc. Natl. Acad. Sci. USA* 58:1852-58.

Olivera, B.M. and I.R. Lehman (1968) Enzymatic joining of polynucleotides, III. The polydeoxyadenylate: polydeoxythymidylate homopolymer pair. *J. Mol. Biol.* 36:261-74.

Definition of pyridine nucleotide cycles: NAD metabolism

Lundquist, R. and B.M. Olivera (1971) Pyridine nucleotide metabolism in *Escherichia coli*. I. Exponential growth. *J. Biol. Chem.* 246:1107-16.

Rechsteiner, M., D. Hillyard and B.M. Olivera (1976) Magnitude and significance of NAD turnover in human cell line D98/AH2. *Nature* 259:695-96.

Hillyard, D., M. Rechsteiner, P.M. Ramos, J.S. Imperial, L.J. Cruz and B.M. Olivera (1981) The pyridine nucleotide cycle. Studies in *E. coli* and the human cell line D98/AH2. *J. Biol. Chem.* 256:8491-97.

Conotoxins: general overviews, physiology and pharmacology

Olivera, B.M., W.R. Gray, R. Zeikus, J.M. McIntosh, J. Varga, J. Rivier, V. de Santos and L.J. Cruz. (1985) Peptide neurotoxins from fish-hunting cone snails. *Science* 230:1338-43.

Olivera, B.M., J. Rivier, C. Clark, C.A. Ramilo, G.P. Corpuz, F.C. Abogadie, E.E. Mena, S.R. Woodward, D.R. Hillyard and L.J. Cruz (1990) Diversity of *Conus* neuropeptides. *Science* 249:257-63.

Terlau, H., K. Shon, M. Grilley, M. Stocker, W. Stühmer and B.M. Olivera (1996) Strategy for rapid immobilization of prey by a fish-hunting cone snail. *Nature* 381:148-51.

Olivera, B. M. (2006) Conus peptides: biodiversity-based discovery and exogenomics. *J Biol Chem*, 281, 31173-7.

Teichert, R.W., N.J. Smith, S. Raghuraman, D. Yoshikami, A.R. Light, B.M. Olivera. (2012) Functional Profiling of Neurons through Cellular Neuropharmacology. *PNAS* (In publication)

Ca⁺⁺ channels and ω -conotoxins

Olivera, B.M., J.M. McIntosh, L.J. Cruz, F.A. Luque and W.R. Gray (1984) Purification and sequence of a presynaptic peptide toxin from *C. geographus* venom. *Biochemistry* 23:5087-90.

Hillyard, D.R., V.D. Monje, I.M. Mintz, B.P. Bean, L. Nadasdi, J. Ramachandran, G. Miljanich, A. Azimi-Zonooz, J.M. McIntosh, L.J. Cruz, J.S. Imperial and B.M. Olivera (1992) A new *Conus* peptide ligand for mammalian presynaptic Ca channels. *Neuron* 9:69-77.

Olivera, B.M., G. Miljanich, J. Ramachandran and M.E. Adams (1994) Calcium channel diversity and neurotransmitter release: the ω -conotoxins and ω -agatoxins. *Ann. Rev. Biochem.* 63:823-67.

Nicotinic antagonists

Gray, W.R., J.E. Rivier, R. Galyean, L.J. Cruz and B.M. Olivera (1983) Conotoxin MI: disulfide bonding and conformational states. *J. Biol. Chem.* 258:12247-51.

Shon, K., M. Grilley, R. Jacobsen, G.E. Cartier, C. Hopkins, W.R. Gray, M. Watkins, D.R. Hillyard, J. Rivier, J. Torres, D. Yoshikami and B.M. Olivera (1997) A noncompetitive peptide inhibitor of the nicotinic acetylcholine receptor from *Conus purpurascens* venom. *Biochemistry* 36:9581-87.

McIntosh, J.M., A.D. Santos and B.M. Olivera (1999) *Conus* peptides targeted to specific nicotinic acetylcholine receptor subtypes. *Annu. Rev. Biochem.* 68:59-88.

Teichert, R. W., Rivier, J., Torres, J., Dykert, J., Miller, C. & Olivera, B. M. (2005) A uniquely selective inhibitor of the mammalian fetal neuromuscular nicotinic acetylcholine receptor. *J Neurosci*, 25, 732-6.

NMDA receptor ligands and conantokins

Olivera, B.M., J.M. McIntosh, C. Clark, D. Middlemas, W.R. Gray and L.J. Cruz (1985) A sleep-inducing peptide from *C. geographus* venom. *Toxicon* 23:277-82.

Haack, J.A., J. Rivier, T.N. Parks, E.E. Mena, L.J. Cruz and B.M. Olivera (1990) Conantokin-T. A γ -carboxylglutamate containing peptide with N-methyl-D-aspartate antagonist activity. *J. Biol. Chem.* 265:6025-29.

White, H.S., T. McCabe, H. Armstrong, S.D. Donevan, L.J. Cruz, F.C. Abogadie, J. Torres, J. E. Rivier, I. Paarmann, M. Hollmann and B.M. Olivera (2000) *In vitro* and *in vivo* characterization of conantokin-R, a selective NMDA receptor antagonist isolated from the venom of the fish-hunting snail *Conus radiatus*. *J. Pharmacol. Exp. Therapeu.* 292:425-32.

Gowd, H.K., T.S. Han, V.D. Twede, J. Gajewiak, M.D. Smith, M. Watkins, R. Platt, G. Toledo, H.S. White, B.M. Olivera, G. Bulaj. (2012) Conantokins derived from the *Asprella* clade impart conRI-B, an N-methyl d-aspartate receptor antagonist with a unique selectivity profile for NR2B subunits. *Biochemistry* 2;51(23):4685-92. doi: 10.1021/bi300055n. Epub 2012 May 30

Molecular biology of *Conus* peptides

Woodward, S.R., L.J. Cruz, B.M. Olivera and D.R. Hillyard (1990) Constant and hypervariable regions in conotoxin propeptides. *EMBO J.* 1:1015-20.

Olivera, B.M. (1997) E.E. Just Lecture - *Conus* venom peptides, receptor and ion channel targets, and drug design: 50 million years of neuropharmacology. *Mol. Biol. Cell* 8:2101-09.

- Santos A.D., J.M. McIntosh, D.R. Hillyard, L.J. Cruz and B.M. Olivera (2004) The A-superfamily of conotoxins: structural and functional divergence. *J Biol Chem*, 279, 17596-606.
- Hu, H., P.K. Bandyopadhyay, B.M. Olivera, M. Yandell (2011) Characterization of the *Conus bullatus* genome and its venom-duct transcriptome. *BMC Genomics*, 12:60.

Post-translation modifications in *Conus*

- Bandyopadhyay, P.K., C.J. Colledge, C.S. Walker, L.-M. Zhou, D.R. Hillyard and B.M. Olivera (1998) Conantokin-G precursor and its role in γ -carboxylation by a vitamin K-dependent carboxylase from a *Conus* snail. *J. Bio. Chem.* 273:5547-50.
- England, L.J., J. Imperial, R. Jacobsen, A.G. Craig, J. Gulyas, M. Akhtar, J. Rivier, D. Julius and B.M. Olivera (1998) Inactivation of a serotonin-gated ion channel by a polypeptide toxin from marine snails. *Science* 281:575-78.
- Bulaj, G., O. Buzek, I. Goodsell, E.C. Jimenez, J. Kranshi, J.S. Nielsen, J.E. Garrett and B.M. Olivera (2003) Efficient oxidative folding of conotoxins and the radiation of venomous cone snails. *Proc. Natl. Acad. Sci. USA* 100 (suppl 2):14562-68.

Evolution of *Conus* and conotoxin genes

- Olivera, B.M., C. Walker, G.E. Cartier, D. Hopper, A.D. Santos, R. Schoenfeld, R. Shetty, M. Watkins, P. Bandyopadhyay and D.R. Hillyard (1999) Speciation of cone snails and interspecific hyperdivergence of their venom peptides. Potential evolutionary significance of introns. *Ann. N.Y. Acad. Sci.* 870:223-37.
- Espiritu, D.J.D., M. Watkins, V. Dia-Monje, G.E. Cartier, L.J. Cruz and B.M. Olivera (2001) Venomous cone snails: molecular phylogeny and the generation of toxin diversity. *Toxicon* 39:1899-1916.
- Olivera, B.M. (2002) *Conus* venom peptides: reflections from the biology of clades and species. *Annu. Rev. Ecol. Syst.* 33:25-47.
- Imperial, J. S., Silvertown, N., Olivera, B. M., Bandyopadhyay, P. K., Sporning, A., Ferber, M. & Terlau, H. (2007) Using Chemistry to Reconstruct Evolution: On the Origins of Fish-hunting in Venomous Cone Snails. *Proc American Philosophical Society*, 151, 185-200.

Complete Chronological List of Publications

- 1964
Olivera, B.M., P. Baine and N. Davidson (1964) Electrophoresis of the nucleic acids. *Biopolymers* 1:245-57.
- 1965
Davidson, N., J. Widholm, U.S. Nandi, R. Jensen, B.M. Olivera and J.C.Wang (1965) Preparation and properties of native crab dAT. *Proc. Natl. Acad. Sci. USA* 53:111-18.
- Olivera, B.M., R.C. Huang and N. Davidson (1965) Elektrophoretische Untersuchungen an Nukleoshistone. *Ber. Bunsenges. Physik. Chem.* 68:802-05.
- 1966
Schwimmer, S. and B.M. Olivera (1966) Electrophoretic properties of enzymically synthesized DNA. *J. Mol. Biol.* 20:585-87.
- Schwimmer, S. and B.M. Olivera (1966) Electrophoresis of products of DNA- and nucleohistone-supported DNA synthesis. *Biopolymers* 4:953-55.
- 1967
Ohlenbusch, H.H., B.M. Olivera, D. Tuan and N. Davidson (1967) Selective dissociation of histones from calf thymus nucleoprotein. *J. Mol. Biol.* 25:299-315.
- Olivera, B.M. and I.R. Lehman (1967) Linkage of polynucleotides through phosphodiester bonds by an enzyme from *Escherichia coli*. *Proc. Natl. Acad. Sci. USA.* 57:1426-33.
- Olivera, B.M. and I.R. Lehman (1967) Diphosphopyridine nucleotide: a cofactor for the polynucleotide joining enzyme from *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 57:1700-04.
- Wang, J.C., D. Baumgarten and B.M. Olivera (1967) On the origin of tertiary turns in covalently closed double-stranded cyclic DNA. *Proc. Natl. Acad. Sci. USA* 58:1852-58.

- 1968
 Olivera, B.M. and I.R. Lehman (1968) Enzymatic joining of polynucleotides, III. The polydeoxyadenylate: polydeoxythymidylate homopolymer pair. *J. Mol. Biol.* 36:261-74.
 Olivera, B.M., I.E. Scheffler and I.R. Lehman (1968) Enzymatic joining of polynucleotides, IV. Formation of a circular deoxyadenylate: deoxythymidylate copolymer. *J. Mol. Biol.* 36:275-85.
 Olivera, B.M., Z. Hall and I.R. Lehman (1968) Enzymatic joining of polynucleotides, V. A DNA-adenylate intermediate in the polynucleotide-joining reaction. *Proc. Natl. Acad. Sci. USA* 61:237-44.
 Olivera, B.M., Z. Hall, Y. Anraku, J.R. Chien and I.R. Lehman (1968) On the mechanism of the polynucleotide joining reaction. *Cold Spring Harbor Symp. Quant. Biol.* 33:27-34.
- 1969
 Laipis, P.J., B.M. Olivera and A.T. Ganesan (1969) Enzymatic cleavage and repair of transforming DNA. *Proc. Natl. Acad. Sci. USA* 62:289-96.
- 1971
 Lundquist, R. and B.M. Olivera (1971) Pyridine nucleotide metabolism in *Escherichia coli*. I. Exponential growth. *J. Biol. Chem.* 246:1107-16.
 Olivera, B.M. and R. Lundquist (1971) DNA synthesis in *Escherichia coli* in the presence of cyanide. *J. Mol. Biol.* 57:263-77.
- 1972
 Olivera, B.M. and F. Bonhoeffer (1972) Replication of ϕ X174 DNA by *Escherichia coli* PolA⁻ *in vitro*. *Proc. Natl. Acad. Sci. USA* 69:25-29.
 Olivera, B.M. and F. Bonhoeffer (1972) Discontinuous DNA replication *in vitro*. I. Two sizes of DNA intermediates. *Nat. New Biol.* 240:233-35.
 Olivera, B.M., K.G. Lark, R. Herrmann and F. Bonhoeffer (1972) Discontinuous DNA synthesis *in vitro*: A method for defining the role of factors in replication in DNA synthesis *in vitro* (R.D. Wells and R.B. Inman, eds.), University Park Press, Baltimore, 1973, pp. 215-31.
- 1973
 Hillyard, D., M.C. Rechsteiner and B.M. Olivera (1973) Pyridine nucleotide metabolism in mammalian cells in culture. *J. Cell Phys.* 82:165-80.
 Lundquist, R. and B.M. Olivera (1973) Pyridine nucleotide metabolism in *Escherichia coli*. II. Niacin starvation. *J. Biol. Chem.* 248:5137-43.
 McLaren, J., D.T.C. Ngo and B.M. Olivera (1973) Pyridine nucleotide metabolism in *Escherichia coli*. III. Biosynthesis from alternative precursors *in vivo*. *J. Biol. Chem.* 248:5144-49.
 Manlapaz-Fernandez, P. and B.M. Olivera (1973) Pyridine nucleotide metabolism in *Escherichia coli*. IV. Turnover. *J. Biol. Chem.* 248:5150-5.
- 1974
 Lundquist, R., P. Manlapaz-Fernandez and B.M. Olivera (1974) A specific effect of deoxycytidine 5'-triphosphate on DNA chain initiation *in vitro*. *J. Mol. Biol.* 83:541-43.
 Olivera, B.M. and F. Bonhoeffer (1974) Replication of *Escherichia coli* requires DNA polymerase I. *Nature* 250:513-14.
 Rechsteiner, M., K. Lund, D. Hillyard and B.M. Olivera (1974) Autoradiographic studies of pyridine nucleotide metabolism in human culture cells. *J. Cell. Phys.* 83:389-400.
- 1975
 Cruz, L.J., A. Reyes, G. Corpuz, E.M. Tecson and B.M. Olivera (1975) A study of *Conus* venom proteins. *NRCP Res. Bull.* 31:122-42.
 Cruz, L.J., J.L. Salabao, E. Flores and B.M. Olivera (1975) Pyridine nucleotide metabolism: purification of a nicotinamide mononucleotide-specific deaminase. *Kimika* 1:40-63.
 Rechsteiner, M., D. Hillyard and B. Olivera (1975) Turnover of nicotinamide adenine dinucleotide in cultures of human cells. *J. Cell Physiol.* 88:207-18.
- 1976
 Cruz, L.J., G. Corpuz and B.M. Olivera (1976) A preliminary study of *Conus* venom protein. *The Veliger* 18:302-08.
 Keyes, T.W., B.M. Olivera, D.J. Stewart and E.W. Hanly (1976) Pyridine nucleotide metabolism in imaginal discs of *Drosophila melanogaster*. *Biochem. Gen.* 14:197-207.
 Rechsteiner, M., D. Hillyard and B.M. Olivera (1976) Magnitude and significance of NAD turnover in human cell line D98/AH2. *Nature* 259:695-96.
 Rechsteiner, M., D. Hillyard and B.M. Olivera (1976) Turnover of NAD in cultures of human cells. *J. Cell. Phys.* 88:207-17.
- 1978
 Cruz, L.J., G. Corpuz and B.M. Olivera (1978) Mating, spawning, development and feeding habits of *Conus geographus* in captivity. *The Nautilus* 92:150-03.
 Cruz, L.J., W.R. Gray and B.M. Olivera (1978) Purification and properties of a myotoxin from *Conus geographus* venom. *Arch. Biochem. Biophys.* 190:539-48.

- Thomas, K.R. and B.M. Olivera (1978) Processivity of DNA exonucleases. *J. Biol. Chem.* 253:424-29.
- Olivera, B.M. (1978) DNA intermediates at the *E. coli* replication fork: effect of dUTP. *Proc. Nat. Acad. Sci. USA* 75:238-42.
1979
- Olivera, B.M., P. Manlapaz-Ramos, H.R. Warner and B.K. Duncan (1979) DNA intermediates at the *E. coli* replication fork. II. Studies on a mutant in uracil DNA glycosidase. *J. Mol. Biol.* 128:265-75.
- Thomas, K.R., P. Manlapaz-Ramos, R. Lundquist and B.M. Olivera (1979) Formation of Okazaki pieces at the *E. coli* replication fork *in vitro*. *Cold Spring Harbor Symp. Quant. Biol.* 43:231-37.
1980
- Manser, T., B.M. Olivera and F.B. Haugli (1980) NAD turnover in microplasmidia of *Physarum polycephalum*. *J. Cell Phys.* 102:379-84.
- Olivera, B.M., M.C. Rechsteiner, P. Manlapaz-Ramos, L.J. Cruz and D. Hillyard (1980) ADP-ribosylation and the pyridine nucleotide cycle. In: *Proceedings of the Conference of Novel ADP-Ribosylation of Regulatory Enzymes and Proteins* (M. Smulson and T. Sugimura, eds.), Elsevier North Holland, pp. 85-98.
- 1981
- Clark, C., B.M. Olivera and L.J. Cruz (1981) A toxin from *Conus geographus* venom which acts on the vertebrate central nervous system. *Toxicon* 19:691-99.
- Gray, W.R., A. Luque, B.M. Olivera, J. Barrett and L.J. Cruz (1981) Peptide toxins from *Conus geographus* venom. *J. Biol. Chem.* 256:4734-40.
- Hillyard, D., M. Rechsteiner, P.M. Ramos, J.S. Imperial, L.J. Cruz and B.M. Olivera (1981) The pyridine nucleotide cycle. Studies in *E. coli* and the human cell line D98/AH2. *J. Biol. Chem.* 256:8491-97.
1982
- Ferro, A.M. and B.M. Olivera (1982) Poly (ADP-ribosylation) *in vitro*. Reaction parameters and enzyme mechanism. *J. Biol. Chem.* 257:7808-13.
- Liu, G.P., J. Foster, P. Manlapaz-Ramos and B.M. Olivera (1982) Nucleoside salvage pathway for NAD biosynthesis in *Salmonella typhimurium*. *J. Bact.* 152:1111-16.
- Lundquist, R.C. and B.M. Olivera (1982) Transient generation of displaced single-stranded DNA during nick translation. *Cell* 31:53-60.
- McIntosh, M., L.J. Cruz, M.W. Hunkapiller, W.R. Gray and B.M. Olivera (1982) Isolation and structure of a peptide toxin from the marine snail *Conus magus*. *Arch. Biochem. Biophys.* 218:329-34.
- Olivera, B.M. and A.M. Ferro (1982) Pyridine nucleotide metabolism and ADP-ribosylation. In: *ADP-Ribosylation Reactions* (O. Hayaishi and K. Ueda, eds.), Academic Press, New York, pp. 19-40.
1983
- Ferro, A.M., N.P. Higgins and B.M. Olivera (1983) Poly(ADP-ribosylation) of a DNA topoisomerase. *J. Biol. Chem.* 258:6000-03.
- Gray, W.R., J.E. Rivier, R. Galyean, L.J. Cruz and B.M. Olivera (1983) Conotoxin MI: Disulfide bonding and conformational states. *J. Biol. Chem.* 258:12247-51.
- Higgins, N.P., P. Manlapaz-Ramos, R.T. Gandhi and B.M. Olivera (1983) Bacteriophage Mu: A transposing replicon. *Cell* 33:623-28.
- Higgins, N.P., D. Moncecchi, P. Manlapaz-Ramos and B.M. Olivera (1983) Mu DNA replication *in vitro*. *J. Biol. Chem.* 258:4293-97.
- Higgins, N.P., D. Moncecchi, M.M. Howe, P. Manlapaz-Ramos and B.M. Olivera (1983) Replicative transposition of bacteriophage Mu *in vitro*. In: *Mechanisms of DNA Replication and Recombination*, Alan R. Liss, New York, pp. 187-201.
- Hughes, K.T., B.T. Cookson, D. Ladika, B.M. Olivera and J.R. Roth (1983) 6-aminonicotinamide resistant mutants of *Salmonella typhimurium*. *J. Bact.* 154:1126-36.
- Hughes, K.T., D. Ladika, J.R. Roth and B.M. Olivera (1983) An indispensable gene for NAD biosynthesis in *S. typhimurium*. *J. Bact.* 155:213-21.
- Jimenez, E.C., B.M. Olivera and L.J. Cruz (1983) Localization of enzymes and possible toxin precursors in granules from *Conus striatus* venom. *Toxicon Suppl.* 3:199-202.
- Thomas, K.R. and B.M. Olivera (1983) Flexibility in RNA priming of Okazaki pieces at the *E. coli* replication fork. *Nucleic Acids Res.* 11:6531-39.
1984
- Ferro, A.M., L.H. Thompson and B.M. Olivera (1984) Poly(ADP-ribosylation) and DNA topoisomerase I in different cell lines. In: *Proteins Involved in DNA Replication* (U. Hubscher and S. Spadari, eds.), Plenum Publishing Corp., pp. 441-47.
- Ferro, A.M., M.C. McElwain and B.M. Olivera (1984) Poly(ADP-ribosylation) of DNA topoisomerase I: A nuclear response to DNA-strand interruptions. *Cold Spring Harbor Symp. Quant. Biol.* 49:683-90.
- Ferro, A.M. and B.M. Olivera (1984) Poly(ADP-ribosylation) of DNA topoisomerase I from calf thymus. *J. Biol. Chem.* 259:547-54.
- Gray, W.R., F.A. Luque, R. Galyean, E. Atherton, R.C. Sheppard, B.L. Stone, A. Reyes, J. Alford, M. McIntosh, B.M. Olivera, L.J. Cruz and J. Rivier (1984) Conotoxin GI: Disulfide bridges, synthesis and preparation of iodinated derivatives. *Biochemistry* 23:2796-2802.
- Higgins, N.P. and B.M. Olivera (1984) Mu DNA replication *in vitro*: Criteria for initiation. *Mol. Gen. Gene.* 194:60-64.

- Higgins, N.P., P. Manlapaz-Ramos and B.M. Olivera (1984) Analysis of Mu DNA replicated on cellophane discs. In: *Proteins Involved in DNA Replication* (U. Hubscher and S. Spadari, eds.), Plenum Publishing Corp., pp. 63-67.
- Jeter, R.M., B.M. Olivera and J.R. Roth (1984) *S. typhimurium* synthesizes cobalamin (Vitamin B12) *de novo* under anaerobic growth conditions. *J. Bact.* 159:206-13.
- McIntosh, J.M., B.M. Olivera, L.J. Cruz and W.R. Gray (1984) γ -Carboxyglutamate in a neuroactive toxin. *J. Biol. Chem.* 259:14343-46.
- Olivera, B.M., J.M. McIntosh, L.J. Cruz, F.A. Luque and W.R. Gray (1984) Purification and sequence of a presynaptic peptide toxin from *C. geographus* venom. *Biochemistry* 23:5087-90.
- 1985
- Cruz, L.J., W.R. Gray, B.M. Olivera, R.D. Zeikus, L. Kerr, D. Yoshikami and E. Moczydlowski (1985) *Conus geographus* toxins that discriminate between neuronal and muscle sodium channels. *J. Biol. Chem.* 260:9280-88.
- Cruz, L.J., W.R. Gray, D. Yoshikami and B.M. Olivera (1985) *Conus* venoms: A rich source of neuroactive peptides. *J. Toxicol.-Toxin Revs.* 4:107-32.
- Gray, W.R., D.M. Middlemas, R. Zeikus, B.M. Olivera and L.J. Cruz (1985) Structure-activity relationships in α -conotoxins: a model. In: *Peptides: Structure and Function*, The Ninth American Peptide Symposium (C.M. Deber, V.J. Hruby and K.D. Kopple, eds.), Pierce Chemicals Pubs., pp. 823-32.
- Olivera, B.M., W.R. Gray, R. Zeikus, J.M. McIntosh, J. Varga, J. Rivier, V. de Santos and L.J. Cruz (1985) Peptide neurotoxins from fish-hunting cone snails. *Science* 230:1338-43.
- Olivera, B.M., J.M. McIntosh, C. Clark, D. Middlemas, W.R. Gray and L.J. Cruz (1985) A sleep-inducing peptide from *C. geographus* venom. *Toxicon* 23:277-82.
- 1986
- Cruz, L.J. and B.M. Olivera (1986) Calcium channel antagonists. ω -Conotoxin defines a new high affinity site. *J. Biol. Chem.* 261:6230-33.
- Ferro, A.M. and B.M. Olivera (1986) Intracellular pyridine nucleotide degradation and turnover. In: *Coenzymes and Cofactors* (D. Dolphin, R. Poulson and O. Avramovic, eds.), John Wiley and Sons, pp. 25-77.
- Moczydlowski, E., B.M. Olivera, W.R. Gray and G.R. Strichartz (1986) Discrimination of muscle and neuronal Na-channel subtypes by binding competition between [³H]saxitoxin and μ -conotoxins. *Proc. Natl. Acad. Sci. USA* 83:5321-25.
- Reynolds, I.J., J.A. Wagner, S.A. Snyder, S.M. Thayer, B.M. Olivera and R.J. Miller (1986) Brain voltage-sensitive calcium channel subtypes differentiated by ω -conotoxin fraction GVIA. *Proc. Nat. Acad. Sci. USA* 83:8804-07.
- 1987
- Cookson, B.T., B.M. Olivera and J.R. Roth (1987) Genetic characterization and regulation of the *nadB* locus of *Salmonella typhimurium*. *J. Bact.* 169:4285-93.
- Cruz, L.J., D.S. Johnson and B.M. Olivera (1987) Characterization of the ω -conotoxin target. Evidence for tissue-specific heterogeneity in calcium channel types. *Biochemistry* 26:820-4.
- Cruz, L.J., G.W. LeCheminant and B.M. Olivera (1987) Biochemical studies of ω -conotoxin GVIA, a peptide toxin inhibiting voltage sensitive Ca channels. In: *Integration and Control of Metabolic Processes* (O.L. Kon et al., eds.), Cambridge University Press, pp. 95-102.
- Cruz, L.J., V. de Santos, G.C. Zafaralla, C.A. Ramilo, R. Zeikus, W.R. Gray and B.M. Olivera (1987) Invertebrate vasopressin/oxytocin homologs. Characterization of peptides from *Conus geographus* and *Conus striatus* venoms. *J. Biol. Chem.* 262:15821-24.
- Feldman, D.H., B.M. Olivera and D. Yoshikami (1987) Omega-*Conus geographus* toxin: a peptide that blocks calcium channels. *FEBS Lett.* 214:295-300.
- Fox, A.P., L.D. Hirning, S. Kongsamut, E.W. McCleskey, R.J. Miller, B.M. Olivera, T.M. Perney, S.M. Thayer and R.W. Tsien (1987) The interaction of toxins with Ca channels. In: *Neurotoxins and Their Pharmacological Implications* (P. Jenner, ed.), Raven Press, New York, NY, pp. 115-131.
- Hughes, K.T., B.M. Olivera and J.R. Roth (1987) Rec dependence of Mu transposition from P22-transduced fragments. *J. Bact.* 169:403-09.
- Jeter, R., J.C. Escalante-Semerena, D. Roof, B.M. Olivera and J. Roth (1987) Synthesis and use of Vitamin B12 in *Escherichia coli* and *Salmonella typhimurium*. In: *Cellular and Molecular Biology* (F.C. Neidhardt, ed.), ASM, Washington, D.C., pp. 6551-56.
- McCleskey EW, Fox AP, Feldman D, Cruz LJ, Olivera BM, Tsien, RW, Yoshikami, D. (1987). ω -conotoxin: direct and persistent blockade of specific types of calcium channels in neurons but not muscle. *PNAS* 84:4327-31
- Olivera, B.M., L.J. Cruz, V. de Santos, G. LeCheminant, D. Griffin, R. Zeikus, J.M. McIntosh, R. Galyean, J. Varga, W.R. Gray and J. Rivier (1987) Neuronal Ca channel antagonists. Discrimination between Ca channel subtypes using ω -conotoxin from *Conus magus* venom. *Biochemistry* 26:2086-90.
- Rivier, J., R. Galyean, L. Simon, L.J. Cruz, B.M. Olivera and W.R. Gray (1987) Total synthesis and further characterization of the γ -carboxyglutamate-containing "sleeper" peptide from *Conus geographus* venom. *Biochemistry* 26:8508-12.
- Rivier, J., R. Galyean, W.R. Gray, A. Azimi-Zonooz, J.M. McIntosh, L.J. Cruz and B.M. Olivera (1987) Neuronal calcium channel inhibitors. Synthesis of ω -conotoxin GVIA and effects on ⁴⁵Ca-uptake by synaptosomes. *J. Biol. Chem.* 262:1194-98.

- Wagner, J.A., A.M. Snowman, B.M. Olivera and S.H. Snyder (1987) Aminoglycoside effects on voltage-sensitive Ca channels and neurotoxicity. *N. Engl. J. Med.* 317:1669.
- 1988
- Cruz, L.J. D.S. Johnson, J.S. Imperial, D. Griffin, G.W. LeCheminant, G.P. Miljanich and B.M. Olivera (1988) ω -Conotoxins and voltage-sensitive calcium channel subtypes. *Curr. Top. Memb. Transp.* 33:417-29.
- DeAizpurua, H.J., E.H. Lambert, G.E. Griesmann, B.M. Olivera and J.A. Lennon (1988) Antagonism of voltage-gated calcium channels in small cell carcinomas of patients with and without Lambert-Eaton Myasthenic Syndrome by autoantibodies, ω -conotoxin and adenosine. *Cancer Res.* 48:4719-24.
- Gray, W.R., B.M. Olivera and L.J. Cruz (1988) Peptide toxins from venomous *Conus* snails. *Ann. Rev. Biochem.* 57:665-700.
- Gray, W.R., B.M. Olivera, L.J. Cruz and J. Rivier (1988) A model for "sleeper peptide" (conotoxin GV) and other Gla-containing molecules. In: *Peptide Chemistry 1987* (T. Shiba and S. Sakakibara, eds.), Protein Research Foundation, Osaka, pp. 105-13.
- Hirning, L.D., A.P. Fox, E.W. McCleskey, B.M. Olivera, S.A. Thayer, R.J. Miller and R.W. Tsien (1988) Dominant role of N-type Ca^{2+} channels in evoked release of norepinephrine from sympathetic neurons. *Science* 239:57-61.
- Hughes, K.T., B.M. Olivera and J.R. Roth (1988) Structural gene for NAD synthetase in *Salmonella typhimurium*. *J. Bact.* 120:2113-20.
- Kerr, L.M., F. Filloux, B.M. Olivera, H. Jackson and J.K. Walmsley (1988) Autoradiographic localization of calcium channels with [^{125}I] ω -conotoxin in rat brain. *Eur. J. Pharmacol.* 146:181-83.
- Olivera, B.M., W.R. Gray and L.J. Cruz (1988) Marine snail venoms. In: *Handbook of Natural Toxins, Vol. 4, Marine Toxins and Venoms* (A. Tu, ed.), Marcel Dekker, Inc., New York and Basel, pp. 327-52.
- Park, U.E., J.R. Roth and B.M. Olivera (1988) *Salmonella typhimurium* mutants lacking NAD pyrophosphatase. *J. Bact.* 170:3725-30.
- Wagner, J.A., A.M. Snowman, A. Biswas, B.M. Olivera and S.H. Snyder (1988) ω -Conotoxin GVIA binding to a high-affinity receptor in brain: characterization, calcium sensitivity, and solubilization. *J. Neurosci.* 9:3354-59.
- Wagner, J.A., S.E. Guggino, I.J. Reynolds, A.M. Snowman, A. Biswas, B.M. Olivera and S.H. Snyder (1988) Calcium antagonist receptors. Clinical and physiological relevance. *Ann. N.Y. Acad. Sci.* 552:116-33.
- Zafaralla, G.C., C. Ramilo, W.R. Gray, R. Karlstrom, B.M. Olivera and L.J. Cruz (1988) Phylogenetic specificity of cholinergic ligands: α -conotoxin SI. *Biochemistry* 27:7102-05.
- Zhu, N., B.M. Olivera and J.R. Roth (1988) Identification of a repressor gene involved in the regulation of NAD *de novo* biosynthesis in *Salmonella typhimurium*. *J. Bact.* 170:117-25.
- 1989
- Cruz, L.J., G. Kupryszewski, G.W. LeCheminant, W.R. Gray, B.M. Olivera and J. Rivier (1989) μ -Conotoxin GIIIA, a peptide ligand for muscle sodium channels: chemical synthesis, radiolabeling and receptor characterization. *Biochemistry* 28:3437-42.
- Hillyard, D.R., B.M. Olivera, S. Woodward, G.P. Corpuz, W.R. Gray, C.A. Ramilo and L.J. Cruz (1989) A molluscivorous *Conus* toxin: conserved frameworks in conotoxins. *Biochemistry* 28:358-61.
- Olivera, B.M., K.T. Hughes, P. Cordray and J.R. Roth (1989) Aspects of NAD metabolism in prokaryotes and eukaryotes. In: *ADP-Ribose Transfer Reactions. Mechanisms and Biological Significance* (M.K. Jacobson and E.L. Jacobson, eds.), Springer Verlag, New York, pp. 353-60.
- Park, U.E., B.M. Olivera, K.T. Hughes, J.R. Roth and D.R. Hillyard (1989) DNA ligase and the pyridine nucleotide cycle in *Salmonella typhimurium*. *J. Bact.* 171:2173-80.
- Yoshikami, D., Z. Bagabaldo and B.M. Olivera (1989) The inhibitory effects of omega-conotoxins on calcium channels and synapses. *Ann. N.Y. Acad. Sci.* 560:230-48.
- Zhu, N., B.M. Olivera and J.R. Roth (1989) Genetic characterization of the *pnuC* gene, which encodes a component of the nicotinamide mononucleotide transport system in *Salmonella typhimurium*. *J. Bact.* 171:4402-09.
- 1990
- Haack, J.A., J. Rivier, T.N. Parks, E.E. Mena, L.J. Cruz and B.M. Olivera (1990) Conantokin-T. A γ -carboxyglutamate containing peptide with N-methyl-D-aspartate antagonist activity. *J. Biol. Chem.* 265:6025-29.
- Higgins, N.P., A.M. Ferro and B.M. Olivera (1990) DNA-topoisomerase modification. In: *DNA Topology and its Biological Effects* (N.R. Cozzarelli and J.C. Wang, eds.), Cold Spring Harbor Laboratory Press., pp. 361-70.
- Mena, E.E., M.F. Gullak, M.J. Pagnozzi, K.E. Richter, J. Rivier, L.J. Cruz and B.M. Olivera (1990) Conantokin-G: A novel peptide antagonist to the N-methyl-D-aspartate (NMDA) receptor. *Neurosci. Lett.* 118:241-44.
- Myers, R.A., J.M. Mcintosh, J. Imperial, R.W. Williams, T. Oas, J.A. Haack, J.F. Hernandez, J. Rivier, L.J. Cruz and B.M. Olivera (1990) Peptides from *Conus* venoms which affect Ca^{++} entry into neurons. *J. Toxin-Toxin Revs.* 9:179-202.
- Olivera, B.M., D.R. Hillyard, J. Rivier, S. Woodward, W.R. Gray, G. Corpuz and L.J. Cruz (1990) Conotoxins: targeted peptide ligands from snail venoms. In: *Marine Toxins: Origins, Structures and Molecular Pharmacology* (S. Hall and G. Strichartz, eds.), American Chemical Society, Washington, D.C., pp. 256-78.
- Olivera, B.M., J. Rivier, C. Clark, C.A. Ramilo, G.P. Corpuz, F.C. Abogadie, E.E. Mena, S.R. Woodward, D.R. Hillyard and L.J. Cruz (1990) Diversity of *Conus* neuropeptides. *Science* 249:257-63.

Woodward, S.R., L.J. Cruz, B.M. Olivera and D.R. Hillyard (1990) Constant and hypervariable regions in conotoxin propeptides. *EMBO J.* 1:1015-20.

1991

Hughes, K.T., J.R. Roth and B.M. Olivera (1991) A genetic characterization of the *nadC* gene of *Salmonella typhimurium*. *Genetics* 127:657-70.

Lev-Ram, V., B.M. Olivera, I.B. Levitan, G.P. Corpus, C.A. Ramilo, D.R. Hillyard and L.J. Cruz (1991) Molluscan *Conus* venoms: a source of toxin probes for molluscan neurobiology. In: *Molluscan Neurobiology* (Proceedings of the third symposium on Molluscan Neurobiology, Amsterdam, Netherlands, August 20-24, 1990) (K.S. Kits, H.H. Boer, J. Joosse, eds.), North-Holland, Amsterdam, pp. 328-34.

Myers, R.A., G.C. Zafaralla, W.R. Gray, J. Abbott, L.J. Cruz and B.M. Olivera (1991) α -Conotoxins, small peptide probes of the nicotinic acetylcholine receptor. *Biochemistry* 30:9370-77.

Olivera, B.M., J. Rivier, J.K. Scott, D.R. Hillyard and L.J. Cruz (1991) Conotoxins. *J. Biol. Chem.* 266:22067-70.

Olivera, B.M., J.S. Imperial, L.J. Cruz, V.P. Bindokas, V.J. Venema and M.E. Adams (1991) Calcium channel-targeted polypeptide toxins. *Ann. N.Y. Acad. Sci.* 635:114-22.

Zhu, N., B.M. Olivera and J.R. Roth (1991) Activity of the nicotinamide mononucleotide transport system is regulated in *Salmonella typhimurium*. *J. Bact.* 173:1311-20.

1992

Cruz, L.J., C.A. Ramilo, G.P. Corpuz and B.M. Olivera (1992) *Conus* peptides: phylogenetic range of biological activity. *Biol. Bull.* 183:159-64.

Cruz, L.J., G.P. Corpuz, C.A. Ramilo, G. Zafaralla, B. Johnson, T. Leitner, D. Yoshikami and B.M. Olivera (1992) The biological role and pharmacological uses of conotoxins. In: *Proceedings of ASOMPS VII, Seventh Asian Symposium on Medicinal Plants, Spices and Other Natural Products* (L.J. Cruz, G.P. Concepcion, M.A.S. Mendigo and B.Q. Guevara, eds.), Manila, Philippines, February 2-7, 1992, pp. 90-97.

Hammerland, L.G., B.M. Olivera and D. Yoshikami (1992) Conantokin-G selectively inhibits NMDA-induced currents in *Xenopus* oocytes injected with mouse brain m-RNA. *Eur. J. Pharmacol.* 226:239-44.

Hillyard, D.R., V.D. Monje, I.M. Mintz, B.P. Bean, L. Nadasdi, J. Ramachandran, G. Miljanich, A. Azimi-Zoonooz, J.M. McIntosh, L.J. Cruz, J.S. Imperial and B.M. Olivera (1992) A new *Conus* peptide ligand for mammalian presynaptic Ca channels. *Neuron* 9:69-77.

McIntosh, J.M., M.E. Adams, B.M. Olivera and F. Filloux (1992) Autoradiographic localization of the binding of calcium channel antagonist, ¹²⁵I- ω -Aga-IIIa, in rat brain. *Brain Res.* 594:109-14.

Olivera, B.M., D.S. Johnson, A. Azimi-Zoonooz and L.J. Cruz (1992) Peptides in the venom of the geography cone, *Conus geographus*. In: *Toxins and Targets*, D. Watters, M. Lavin, D. Maguire and J. Pearn (eds.), Harwood Academic Publishers, Chur, Switzerland, pp. 19-28.

Olivera, B.M., J. Imperial, J. Hunsperger, C. Colledge, R.A. Myers, A.D. Santos, V.D. Monje and L.J. Cruz (1992) *Conus* peptides, a pharmacologically diverse class of marine natural products. In: *Proceedings of ASOMPS VII, Seventh Asian Symposium on Medicinal Plants, Spices and Other Natural Products* (L.J. Cruz, G.P. Concepcion, M.A.S. Mendigo and B.Q. Guevara, eds.), Manila, Philippines, February 2-7, 1992, pp. 19-29.

Olivera, B.M., L.J. Cruz, R.A. Myers, D.R. Hillyard, J. Rivier and J.K. Scott (1992) *Conus* peptides and biotechnology. In: *Neurotox '91: Molecular Basis of Drug and Pesticide Action* (I.R. Duce, ed.), Elsevier, Applied Science, London, pp. 45-55.

Ramilo, C.A., G.C. Zafaralla, L. Nadasdi, L.G. Hammerland, D. Yoshikami, W.R. Gray, J. Ramachandran, G. Miljanich, B.M. Olivera and L.J. Cruz (1992) Novel α - and ω -conotoxins from *Conus striatus* venom. *Biochemistry* 31:9919-26.

Santos, A.D., J.S. Imperial, T. Chaudhary, R.C. Beavis, B.T. Chait, J.P. Hunsperger, B.M. Olivera, M.E. Adams and D.R. Hillyard (1992) Heterodimeric structure of the spider toxin ω -Aga-IA revealed by precursor analysis and mass spectrometry. *J. Biol. Chem.* 267:20701-05.

1993

Adams, M.E., R.A. Myers, J.S. Imperial and B.M. Olivera (1993) Toxotyping rat brain calcium channels with ω -toxins from spider and cone snail venoms. *Biochemistry* 32:12566-70.

Albensi, B.C., K.T. Ryujin, J.M. McIntosh, B.M. Olivera and F.M. Filloux (1993) Autoradiographic localization of [¹²⁵I] ω -conotoxin GVIA binding sites in human hippocampus and cerebellum. *NeuroReport* 4:1331-34.

Cruz, L.J. and B.M. Olivera (1993) *Conus* venom neuropeptides. In: *Neuroscience Year; Supplement 3* (B. Smith and G. Adelman, eds.), Birkhauser Publishing, Cambridge, MA, pp. 3-33.

Haack, J.A., P. Kinser, D. Yoshikami and B.M. Olivera (1993) Biotinylated derivatives of ω -conotoxins GVIA and MVIID: probes for neuronal calcium channels. *Neuropharmacology* 32:1151-59.

Haack, J.A., T.N. Parks and B.M. Olivera (1993) Conantokin-G antagonism of the NMDA receptor subtype expressed in cultured cerebellar granule cells. *Neurosci. Lett.* 163:63-66.

McIntosh, J.M., T.A. Foderaro, W. Li, C.M. Ireland and B.M. Olivera (1993) Presence of serotonin in the venom of *Conus imperialis*. *Toxicon* 32:1561-66.

- Monje, V.D., J. Haack, S. Naisbitt, G. Miljanich, J. Ramachandran, L. Nasdasdi, B.M. Olivera, D.R. Hillyard and W.R. Gray (1993) A new *Conus* peptide ligand for Ca channel subtypes. *Neuropharmacology* 32:1141-49.
- Myers, R.A., L.J. Cruz, J. Rivier and B.M. Olivera (1993) *Conus* peptides as chemical probes for receptors and ion channels. *Chem. Rev.* 93:1923-36.
- Olivera, B.M., J.M. McIntosh and L.J. Cruz (1993) *Conus* peptides as tools for the neuroscientist. In: *Gene — Brain — Behaviour*, Proceedings of the 21st Göttingen Neurobiology Conference (N. Elsner and M. Heisenberg, eds.), Georg Thieme Verlag, Stuttgart, New York, pp. 159-69.
- Tisa, L.S., B.M. Olivera and J. Adler (1993) Inhibition of *Escherichia coli* chemotaxis by ω -conotoxin, a calcium-ion channel blocker. *J. Bacteriol.* 175:1235-38.
- 1994
- Adams, M.E. and B.M. Olivera (1994) Neurotoxins: Overview of an emerging research technology. *TINS* 17:151-55.
- Filloux, F., A. Schapper, S. Naisbitt, B.M. Olivera and J.M. McIntosh (1994) Complex patterns of [¹²⁵I] ω -conotoxin GVIA binding site expression during postnatal rat brain development. *Dev. Brain Res.* 78:131-36.
- Filloux, F., J. Karras, J.S. Imperial, W.R. Gray and B.M. Olivera (1994) The distribution of ω -conotoxin MVIIC_{nlc}-binding sites in rat brain measured by autoradiography. *Neurosci. Lett.* 178:263-66.
- Lev-Ram, V., B.M. Olivera and I.B. Levitan (1994) A toxin from the venom of the predator snail *Conus textile* modulates ionic currents in *Aplysia* bursting pacemaker neurons. *Brain Res.* 640:48-55.
- McIntosh, J.M., D. Yoshikami, E. Mahe, D.B. Nielsen, J.E. Rivier, W.R. Gray and B.M. Olivera (1994) A nicotinic acetylcholine receptor ligand of unique specificity, α -conotoxin ImI. *J. Biol. Chem.* 269:16733-39.
- Olivera, B.M., G. Miljanich, J. Ramachandran and M.E. Adams (1994) Calcium channel diversity and neurotransmitter release: The ω -conotoxins and ω -agatoxins. *Ann. Rev. Biochem.* 63:823-67.
- Shon, K.-J., A. Hasson, M.E. Spira, L.J. Cruz, W.R. Gray and B.M. Olivera (1994) δ -Conotoxin GmVIA, a novel peptide from the venom of *Conus gloriamaris*. *Biochemistry* 33:11420-55.
- 1995
- Hasson, A., K. Shon, B.M. Olivera and M.E. Spira (1995) Alterations of voltage-activated Na current by a novel conotoxin from the venom of *Conus gloriamaris*. *J. Neurophysiol.* 73:1295-301.
- Hopkins, C., M. Grilley, C. Miller, K. Shon, L.J. Cruz, W.R. Gray, J. Dykert, J. Rivier, D. Yoshikami and B.M. Olivera (1995) A new family of *Conus* peptides targeted to the nicotinic acetylcholine receptor. *J. Biol. Chem.* 270:22361-67.
- Martinez, J.S., B.M. Olivera, W.R. Gray, A.G. Craig, D.R. Groebe, S.N. Abramson and J.M. McIntosh (1995) α -Conotoxin EI, a new nicotinic acetylcholine receptor antagonist with novel selectivity. *Biochemistry* 34:4519-26.
- McIntosh, J.M., A. Hasson, M.E. Spira, W.R. Gray, W. Li, M. Marsh, D.R. Hillyard, and B.M. Olivera (1995) A new family of conotoxins that block voltage-gated sodium channels. *J. Biol. Chem.* 270:16796-802.
- McIntosh, J.M., F. Ghomashchi, M.H. Gelb, D.J. Dooley, S.J. Stoehr, A.B. Giordani, S.R. Naisbitt and B.M. Olivera (1995) Conodipine-M, a novel phospholipase A₂ isolated from the venom of the marine snail *Conus magus*. *J. Biol. Chem.* 270:3518-26.
- Olivera, B.M., D.R. Hillyard, M. Marsh and D. Yoshikami (1995) Combinatorial peptide libraries in drug design: lessons from venomous cone snails. *Trends Biotech.* 13:422-426.
- Shon, K., M. Grilley, M. Marsh, D. Yoshikami, A. Adrienne, R. Hall, B. Kurz, W. Gray, J. Imperial, D. Hillyard and B.M. Olivera (1995) Purification, characterization, synthesis, and cloning of the lockjaw peptide from *Conus purpurascens* venom. *Biochemistry* 34:4913-17.
- 1996
- Albillos, A., A.G. García, B. Olivera and L. Gandía (1996) Re-evaluation of the P/Q Ca²⁺ channel components of Ba²⁺ currents in bovine chromaffin cells superfused with solutions containing low and high Ba²⁺ concentrations. *Plügers Arch. Eur. J. Physiol.* 432:1030-08.
- Cartier, G.E., D. Yoshikami, W.R. Gray, S. Luo, B.M. Olivera and J.M. McIntosh (1996) A new α -conotoxin which targets α 3 β 2 nicotinic acetylcholine receptors. *J. Biol. Chem.* 271:7522-28.
- Jimenez, E.C., B.M. Olivera, W.R. Gray and L.J. Cruz (1996) Contryphan, a D-tryptophan-containing *Conus* peptide. *J. Biol. Chem.* 271:28002-05.
- Mitchell, S.S., K. Shon, B. Olivera and C.M. Ireland (1996) NMR structures of conotoxins. *J. Nat. Toxins* 5:191-208.
- Tabata, T., B.M. Olivera and A.T. Ishida (1996) ω -Conotoxin MVIID blocks an ω -conotoxin GVIA sensitive high-threshold Ca²⁺ current in fish retinal ganglion cells. *Neuropharmacology* 35:633-36.
- Terlau, H., K. Shon, M. Grilley, M. Stocker, W. Stühmer and B.M. Olivera (1996) Strategy for rapid immobilization of prey by a fish-hunting cone snail. *Nature* 381:148-51.
- Terlau, H., M. Stocker, K. Shon, J.M. McIntosh and B.M. Olivera (1996) μ O-Conotoxin MrVIA inhibits mammalian sodium channels but not through site I. *J. Neurophysiol.* 76:90-96.
- Wilson, G.F., F.C. Richardson, T.E. Fisher, B.M. Olivera and L.K. Kaczmarek (1996) Identification and characterization of a Ca²⁺-sensitive nonspecific cation channel underlying prolonged repetitive firing in *Aplysia* neurons. *J. Neurosci.* 16:3661-71.

1997

- Craig, A.G., E.C. Jimenez, J. Dykert, D.B. Nielsen, J. Gulyas, F.C. Abogadie, J. Porter, J.E. Rivier, L.J. Cruz, B.M. Olivera and J.M. McIntosh (1997) A novel post translational modification involving bromination of tryptophan: identification of the residue, L-6-bromotryptophan, in peptides from *Conus imperialis* and *Conus radiatus* venom. *J. Biol. Chem.* 272:4689-98.
- Gandía, L., B. Lara, J.S. Imperial, M. Villarroya, A. Albillos, R. Maroto, A.G. García and B.M. Olivera (1997) Analogies and differences between ω -conotoxins MVIIC and MVIID: binding sites and functions in bovine chromaffin cells. *Pflugers Arch. Eur. J. Physiol.* 435:55-64.
- Han, K., K. Hwang, S.-M. Kim, S.-K. Kim, W. Gray, B.M. Olivera, J. Rivier and K. Shon (1997) NMR structure determination of a novel conotoxin, [Pro 7,13] α A-conotoxin PIVA. *Biochemistry* 36:1669-77.
- Jacobsen, R., D. Yoshikami, M. Ellison, J. Martinez, W.R. Gray, G.E. Cartier, K. Shon, D.R. Groebe, S.N. Abramson, B.M. Olivera and J.M. McIntosh (1997) Differential targeting of nicotinic acetylcholine receptors by novel α A-conotoxins. *J. Biol. Chem.* 262:22531-37.
- Jimenez, E.C., A.G. Craig, M. Watkins, D.R. Hillyard, W.R. Gray, J. Gulyas, J. Rivier, L.J. Cruz and B.M. Olivera (1997) Bromocontryphan, a post-translationally brominated tryptophan-containing peptide. *Biochemistry* 36:989-94.
- Kim, M., D.J. Baro, C.C. Lanning, M. Doshi, J. Farnham, H.S. Moskowitz, J.H. Peck, B.M. Olivera and R.M. Harris-Warrick (1997) Alternative splicing in the pore-forming region of *shaker* potassium channels. *J. Neurosci.* 17:8213-24.
- Kulak, J.M., T.A. Nguyen, B.M. Olivera and J.M. McIntosh (1997) α -Conotoxin MII blocks nicotine-stimulated dopamine release in rat striatal synaptosomes. *J. Neurosci.* 17:5263-70.
- Olivera, B.M. (1997) E.E. Just Lecture - *Conus* venom peptides, receptor and ion channel targets, and drug design: 50 million years of neuropharmacology. *Mol. Biol. Cell* 8:2101-09.
- Olivera, B.M. and D.J. Steel (1997) Conantokins (*Conus* spp.) In *Guidebook to Protein Toxins and Their Use in Cell Biology* (R. Rappuoli and C. Montecucco, eds.), Oxford University Press, p. 249-50.
- Olivera, B.M. and J.M. McIntosh (1997) α -Conotoxins (*Conus* spp.) In *Guidebook to Protein Toxins and Their Use in Cell Biology* (R. Rappuoli and C. Montecucco, eds.), Oxford University Press, p. 202-03.
- Olivera, B.M., J.S. Imperial and D. Yoshikami (1997) ω -Conotoxins (*Conus* spp.). In *Guidebook to Protein Toxins and Their Use in Cell Biology* (R. Rappuoli and C. Montecucco, eds.), Oxford University Press, p. 170-72.
- Shon, K., M. Grilley, R. Jacobsen, G.E. Cartier, C. Hopkins, W.R. Gray, M. Watkins, D.R. Hillyard, J. Rivier, J. Torres, D. Yoshikami and B.M. Olivera (1997) A noncompetitive peptide inhibitor of the nicotinic acetylcholine receptor from *Conus purpurascens* venom. *Biochemistry* 36:9581-87.
- Shon, K., S.C. Koerber, J.E. Rivier, B.M. Olivera and J.M. McIntosh (1997) Three-dimensional solution structure of α -conotoxin MII, an α 3/2 neuronal nicotinic receptor-targeted ligand. *Biochemistry* 36:15693-700.
- Stanley, T.B., D.W. Stafford, B.M. Olivera and P.K. Bandyopadhyay (1997) Identification of a vitamin K-dependent carboxylase in the venom duct of a *Conus* snail. *FEBS Lett.* 407:85-88.
- Tavazoie, S.F., M.F. Tavazoie, J.M. McIntosh, B.M. Olivera and D. Yoshikami (1997) Differential block of nicotinic synapses on B versus C neurones in sympathetic ganglia of frog by α -conotoxins MII and ImI. *Brit. J. Pharmacol.* 120:995-1000.

1998

- Bandyopadhyay, P.K., C.J. Colledge, C.S. Walker, L.-M. Zhou, D.R. Hillyard and B.M. Olivera (1998) Conantokin-G precursor and its role in γ -carboxylation by a vitamin K-dependent carboxylase from a *Conus* snail. *J. Bio. Chem.* 273:5547-50.
- Craig, A.G., G. Zafaralla, L.J. Cruz, A.D. Santos, D.R. Hillyard, J. Dykert, J.E. Rivier, W.R. Gray, J. Imperial, R.G. Delacruz, A. Sporning, H. Terlau, P.J. West, D. Yoshikami and B.M. Olivera (1998) An O-glycosylated neuroexcitatory *Conus* peptide. *Biochemistry* 37:16019-25.
- England, L.J., J. Imperial, R. Jacobsen, A.G. Craig, J. Gulyas, M. Akhtar, J. Rivier, D. Julius and B.M. Olivera (1998) Inactivation of a serotonin-gated ion channel by a polypeptide toxin from marine snails. *Science* 281:575-78.
- Jacobsen, R., E.C. Jimenez, M. Grilley, M. Watkins, D. Hillyard, L.J. Cruz and B.M. Olivera (1998) The contryphans, a D-tryptophan-containing family of *Conus* peptides: interconversion between conformers. *J. Peptide Res.* 51:173-79.
- López, M.G., C. Montiel, C.J. Herrero, E. García-Palomero, I. Mayorgas, J.M. Hernández-Guijo, M. Villarroya, R. Olivares, L. Gandía, J.M. McIntosh, B.M. Olivera and A.G. García (1998) Unmasking the functions of the chromaffin cell α 7 nicotinic receptor by using short pulses of acetylcholine and selective blockers. *Proc. Natl. Acad. Sci. USA* 95:14184-89.
- Luo, S., J.M. Kulak, G.E. Cartier, R.B. Jacobsen, D. Yoshikami, B.M. Olivera and J.M. McIntosh (1998) α -Conotoxin AuIB selective blocks α 3 β 4 nicotinic acetylcholine receptors and nicotine-evoked norepinephrine release. *J. Neurosci.* 18:8571-79.
- Ramirez, J.M., S.W. Schwarzacher, O. Pierrefiche, B.M. Olivera and D.W. Richter (1998) Selective lesioning of the cat pre-Bötzinger complex *in vivo* eliminates breathing but not gasping. *J. Physiol.* 507:895-907.
- Shon, K.-J., B.M. Olivera, M. Watkins, R.B. Jacobsen, W.R. Gray, C.Z. Floresca, L.J. Cruz, D.R. Hillyard, A. Brink, H. Terlau and D. Yoshikami (1998) μ -Conotoxin PIIIA, a new peptide for discriminating among tetrodotoxin-sensitive Na channel subtypes. *J. Neurosci.* 18:4473-81.
- Shon, K.-J., M. Stocker, H. Terlau, W. Stühmer, R. Jacobsen, C. Walker, M. Grilley, M. Watkins, D.R. Hillyard, W.R. Gray and B.M. Olivera (1998) κ -Conotoxin PVIIA is a peptide inhibiting the *Shaker* K⁺ channel. *J. Biol. Chem.* 273:33-38.

1999

- Craig, A.G., P. Bandyopadhyay and B.M. Olivera (1999) Post-translationally modified neuropeptides from *Conus* venoms. *Eur. J. Biochem.* 264:271-75.
- Craig, A.G., T. Norberg, D. Griffin, C. Hoeger, M. Akhtar, K. Schmidt, W. Low, J. Dykert, E. Richelson, V. Navarro, J. Mazella, M. Watkins, D. Hillyard, J. Imperial, L.J. Cruz and B.M. Olivera (1999) Contulakin-G, an O-glycosylated invertebrate neurotensin. *J. Biol. Chem.* 274:13752-59.
- Jacobsen, R.B., E.C. Jimenez, R.G.C. DelaCruz, W.R. Gray, L.J. Cruz and B.M. Olivera (1999) A novel D-leucine-containing *Conus* peptide: diverse conformational dynamics in the contryphan family. *J. Peptide Res.* 54:93-99.
- Jacobsen, R.B., R.G. DelaCruz, J.H. Grose, J.M. McIntosh, D. Yoshikami and B.M. Olivera (1999) Critical residues influence the affinity and selectivity of α -conotoxin MI for nicotinic acetylcholine receptors. *Biochemistry* 38:13310-15.
- Lirazan, M.B., A.G. Craig, R. Shetty, C.S. Walker, B.M. Olivera and L.J. Cruz (1999) Multiple bromotryptophan and γ -carboxyglutamate residues in a *Conus* peptide. *Phil. J. Sci.* 128:239-46.
- Luo, S., T.A. Nguyen, G.E. Cartier, B.M. Olivera, D. Yoshikami and J.M. McIntosh (1999) Single-residue alteration in α -conotoxin PnIA switches its nAChR subtype selectivity. *Biochemistry* 38:14542-48.
- McIntosh, J.M., A.D. Santos and B.M. Olivera (1999) *Conus* peptides targeted to specific nicotinic acetylcholine receptor subtypes. *Annu. Rev. Biochem.* 68:59-88.
- McIntosh, J.M., B.M. Olivera and L.J. Cruz (1999) *Conus* peptides as probes for ion channels. *Methods Enzymol.* 294:605-24.
- Monje, V.D., R. Ward, B.M. Olivera and L.J. Cruz (1999) 16S mitochondrial ribosomal RNA sequences: a comparison of seven *Conus* species. *Phil. J. Sci.* 128:225-37.
- Olivera, B.M. (1999) *Conus* venom peptides: correlating chemistry and behavior. *J. Comp. Physiol. A* 185:353-59.
- Olivera, B.M. (1999) The subfamily Turrinae in the Philippines: the genus *Turris* (Röding, 1798). *Phil. J. Sci.* 128:295-318.
- Olivera, B.M., C. Walker, G.E. Cartier, D. Hooper, A.D. Santos, R. Schoenfeld, R. Shetty, M. Watkins, P. Bandyopadhyay and D.R. Hillyard (1999) Speciation of cone snails and interspecific hyperdivergence of their venom peptides. Potential evolutionary significance of introns. *Ann. N.Y. Acad. Sci.* 870:223-37.
- Olivera, B.M., L.J. Cruz and D. Yoshikami (1999) Effects of *Conus* peptides on the behavior of mice. *Curr. Op. Neurobiol.* (Neurobiology of Behavior) 9:772-77.
- Pallaghy, P.K., A.P. Melnikova, E.C. Jimenez, B.M. Olivera and R.S. Norton (1999) Solution structure of contryphan-R, a naturally-occurring disulfide-bridged octapeptide containing D-tryptophan. Comparison with protein loops. *Biochemistry* 38:11553-59.
- Terlau, H., A. Boccaccio, B.M. Olivera and F. Conti (1999) The block of *Shaker* K⁺ channels by κ -conotoxin PVIIA is state dependent. *J. Gen. Physiol.* 114:125-40.
- Walker, C., D. Steel, R.B. Jacobsen, M.B. Lirazan, L.J. Cruz, D. Hooper, R. Shetty, R.C. DelaCruz, J.S. Nielsen, L.M. Zhou, P. Bandyopadhyay, A. Craig and B.M. Olivera (1999) The T-superfamily of conotoxins. *J. Biol. Chem.* 274:30664-71.
- 2000
- Cho, J., K.H. Mok, B.M. Olivera, J.M. McIntosh, K. Park and K. Han (2000) Nuclear magnetic resonance solution conformation of α -conotoxin AuIB, an α 3 β 4 subtype-selective neuronal nicotinic acetylcholine receptor antagonist. *J. Biol. Chem.* 275:8680-85.
- Hooper, D., M.B. Lirazan, R. Schoenfeld, B. Cook, L.J. Cruz, B.M. Olivera and P. Bandyopadhyay (2000) Post-translational modification: a two dimensional strategy for molecular diversity of *Conus* peptides. In *Peptides for the New Millennium: Proceedings of the Sixteenth American Peptide Symposium* (G.B. Fields, J.P. Tam and G. Barany, eds.), Kluwer Academic Publishers, Dordrecht, The Netherlands, 727-29.
- Jacobsen, R.B., E.D. Koch, B. Lang-Malecki, M. Stocker, J. Verhey, R.M. Van Wagoner, A. Vyazovkina, B.M. Olivera and H. Terlau (2000) Single amino acid substitutions in κ -conotoxin PVIIA disrupt interaction with the *Shaker* K⁺ channel. *J. Biol. Chem.* 275:24639-44.
- Lirazan, M.B., D. Hooper, G.P. Corpuz, C.A. Ramilo, P. Bandyopadhyay, L.J. Cruz and B.M. Olivera (2000) The spasmodic peptide defines a new conotoxin superfamily. *Biochemistry* 39:1583-88.
- McIntosh, J.M., G.O. Corpuz, R.T. Layer, J.E. Garrett, J.D. Wagstaff, G. Bulaj, A. Vyazovkina, D. Yoshikami, L.J. Cruz and B.M. Olivera (2000) Isolation and characterization of a novel *Conus* peptide with apparent antinociceptive activity. *J. Biol. Chem.* 275:32391-97.
- Olivera, B.M. (2000) ω -Conotoxin MVIIA: from marine snail venom to analgesic drug. In *Drugs from the Sea* (N. Fusetani, ed.), Karger, Basel, 74-85.
- Pallaghy, P.K., W. He, E.C. Jimenez, B.M. Olivera and R.S. Norton (2000) Structures of the contryphan family of cyclic peptides. Role of electrostatic interactions in cis-trans isomerism. *Biochemistry* 39:12845-52.
- Safo, P., T. Rosenbaum, A. Shcherbatko, D. Choi, E. Han, J. Toledo-Aral, B.M. Olivera, P. Brehm and G. Mandel (2000) Distinction among neuronal subtypes of voltage-activated sodium channels by μ -conotoxin PIIIA. *J. Neurosci.* 20:76-80.
- White, H.S., T. McCabe, H. Armstrong, S.D. Donevan, L.J. Cruz, F.C. Abogadie, J. Torres, J.E. Rivier, I. Paarmann, M. Hollmann and B.M. Olivera (2000) *In vitro* and *in vivo* characterization of conantokin-R, a selective NMDA receptor antagonist isolated from the venom of the fish-hunting snail *Conus radiatus*. *J. Pharmacol. Exp. Therapeu.* 292:425-32.

2001

- Azimi-Zonooz, A., C.B. Kawa, C.D. Dowell and B.M. Olivera (2001) Autoradiographic localization of N-type VGCCs in gerbil hippocampus and failure of ω -conotoxin MVIIA to attenuate neuronal injury after transient cerebral ischemia. *Brain Res.* 907:61-70.
- Bulaj, G., R. DeLaCruz, A. Azimi-Zonooz, P. West, M. Watkins, D. Yoshikami and B.M. Olivera (2001) δ -Conotoxin structure/function through a cladistic analysis. *Biochemistry* 40:13201-08.
- Espiritu, D.J.D., M. Watkins, V. Dia-Monje, G.E. Cartier, L.J. Cruz and B.M. Olivera (2001) Venomous cone snails: molecular phylogeny and the generation of toxin diversity. *Toxicon* 39:1899-1916.
- Jimenez, E.C., M. Watkins, L.J. Juszczak, L.J. Cruz and B.M. Olivera (2001) Contryphans from *Conus textile* venom ducts. *Toxicon* 39:803-08.
- Jones, R.M., G.E. Cartier, J.M. McIntosh, G. Bulaj, V.E. Farrar and B.M. Olivera (2001) Composition and therapeutic utility of conotoxins from genus *Conus*. Patent status 1996-2000. *Exp. Opin. Ther. Patents* 11:603-23.
- Jones, R.M., G.E. Cartier, J.M. McIntosh, G. Bulaj, V.E. Farrar and B.M. Olivera (2001) Composition and therapeutic utility of conotoxins from genus *Conus*. Patent status 1996-2000. *Exp. Opin. Ther. Patents* 11:603-23.
- Kulak, J.M., J.M. McIntosh, D. Yoshikami and B.M. Olivera (2001) Nicotine-evoked transmitter release in synaptosomes: functional association of specific presynaptic acetylcholine receptors and voltage-gated calcium channels. *J. Neurochem.* 77:2581-89.
- Olivera, B.M. and L.J. Cruz (2001) Conotoxins, in retrospect. *Toxicon* 39:7-14.
- Walker, C.S., R.P. Shetty, K. Clark, S.G. Kazuko, A. Letsou, B.M. Olivera and P.K. Bandyopadhyay (2001) On a potential global role for vitamin K-dependent γ -carboxylation in animal systems. Evidence for a γ -glutamyl carboxylase in *Drosophila*. *J. Biol. Chem.* 276:7769-74.

2002

- Bandyopadhyay, P.K., J.E. Garrett, R.P. Shetty, T. Keate, C.S. Walker and B.M. Olivera (2002) γ -Glutamyl carboxylation: an extracellular post-translational modification that antedates the divergence of molluscs, arthropods and chordates. *Proc. Natl. Acad. Sci. USA* 99:1264-69.
- Espiritu, J.D., L.J. Cruz, G.E. Cartier and B.M. Olivera (2002) Venomous gastropods: *Conus*, conoideans and other neogastropod families. *Bollettino Malacologico* (Italy) Supplemento 4:147-60.
- Jimenez, E.C., S. Donevan, C. Walker, L.-M. Zhou, J. Nielsen, L.J. Cruz, H. Armstrong, H.S. White and B.M. Olivera (2002) Conantokin-L, a new NMDA receptor antagonist: determinants for anticonvulsant potency. *Epilepsy Res.* 51:73-80.
- Lirazan, M., E.C. Jimenez, A.G. Craig, B.M. Olivera and L.J. Cruz (2002) Conophysin-R, a *Conus radiatus* venom peptide belonging to the neurophysin family. *Toxicon* 40:901-08.
- Maillo, M., M.B. Aguilar, E. Lopez-Vera, A.G. Craig, G. Bulaj, B.M. Olivera and E.P. Heimer de la Cortera (2002) Conorfamide, a *Conus* venom peptide belonging to the RFamide family of neuropeptides. *Toxicon* 40:401-17.
- McIntosh, J.M., C. Dowell, M. Watkins, J.E. Garrett, D. Yoshikami and B.M. Olivera (2002) α -Conotoxin GIC from *Conus geographus*, a novel peptide antagonist of nicotinic acetylcholine receptors. *J. Biol. Chem.* 277:33610-15.
- Miles, L.A., C.Y. Dy, J. Nielsen, K.J. Barnham, M.G. Hinds, B.M. Olivera, G. Bulaj and R.S. Norton (2002) Structure of a novel P-superfamily spasmodic conotoxin reveals an inhibitory cystine knot motif. *J. Biol. Chem.* 277:43033-40.
- Olivera, B.M. (2002) The gastropod genus *Xenuroturris* (Iredale, 1929) evaluated and a new turrid *Lophiotoma olangoensis*, described from the central Philippines. *Sci. Diliman* 14:39-49.
- Olivera, B.M. (2002) *Conus* venom peptides: reflections from the biology of clades and species. *Annu. Rev. Ecol. Syst.* 33:25-47.
- Olivera, B.M., J.S. Imperial and G. Bulaj (2002) Cone snails and conotoxins: evolving sophisticated neuropharmacology. In *Perspectives in Molecular Toxinology* (A. Menez, ed.), John Wiley and Sons Ltd, West Sussex, England, p. 143-58.
- Rong, Y.S., S. Titen, H. Xie, M.M. Golic, M. Bastiani, P. Bandyopadhyay, B.M. Olivera, M. Brodsky, G.M. Rubin and K.G. Golic (2002) Targeted mutagenesis by homologous recombination in *Drosophila melanogaster*. *Genes Dev.* 16:1568-81.
- West, P.J., G. Bulaj, J.E. Garrett, B.M. Olivera and D. Yoshikami (2002) μ -Conotoxin SmIIIA, a potent inhibitor of tetrodotoxin-resistant sodium channels in amphibian sympathetic and sensory neurons. *Biochemistry* 41:15388-93.

2003

- Bulaj, G., O. Buzek, I. Goodsell, E.C. Jimenez, J. Kranshi, J.S. Nielsen, J.E. Garrett and B.M. Olivera (2003) Efficient oxidative folding of conotoxins and the radiation of venomous cone snails. *Proc. Natl. Acad. Sci. USA* 100 (suppl 2):14562-68.
- Chi, S.W., K.H. Park, J.E. Suk, B.M. Olivera, J.M. McIntosh and K.H. Han (2003) Solution conformation of α A-conotoxin EIVA, a potent neuromuscular nicotinic acetylcholine receptor antagonist from *Conus ermineus*. *J. Biol. Chem.* 278:42208-13.
- Dowell, C., B.M. Olivera, J.E. Garrett, S.T. Saheli, M. Watkins, A. Kuryatov, D. Yoshikami, J.M. Lindstrom and J.M. McIntosh (2003) α -Conotoxin PIA is selective for $\alpha 6$ subunit-containing nicotinic acetylcholine receptors. *J. Neurosci.* 23:9445-52.
- Ellison, M., J.M. McIntosh and B.M. Olivera (2003) α -Conotoxins ImI and ImII. Similar $\alpha 7$ nicotinic receptor antagonists act at different sites. *J. Biol. Chem.* 278:757-64.
- Ferber, M., A. Sporning, G. Jeserich, R. DeLaCruz, M. Watkins, B.M. Olivera and H. Terlau (2003) A novel *Conus* peptide ligand for K^+ channels. *J. Biol. Chem.* 278:2177-83.
- Imperial, J.S., M. Watkins, P. Chen, D.R. Hillyard, L.J. Cruz and B.M. Olivera (2003) The augertoxins: biochemical characterization of venom components from the toxoglossate gastropod *Terebra subulata*. *Toxicon* 42:391-98.

- Jimenez, E.C., R.P. Shetty, M. Lirazan, J. Rivier, C. Walker, F.C. Abogadie, D. Yoshikami, L.J. Cruz and B.M. Olivera (2003) Novel excitatory *Conus* peptides define a new conotoxin superfamily. *J. Neurochem.* 85:610-21.
- Keizer, D.W., P.J. West, E.F. Lee, D. Yoshikami, B.M. Olivera, G. Bulaj and R.S. Norton (2003) Structural basis for tetrodotoxin-resistant sodium channel binding by μ -conotoxin SmIIIa. *J. Biol. Chem.* 278:46805-13.
- Van Wagoner, R.M., R.B. Jacobsen, B.M. Olivera and C.M. Ireland (2003) Characterization and three-dimensional structure determination of ψ -conotoxin PIIIF, a novel noncompetitive antagonist of nicotinic acetylcholine receptors. *Biochemistry* 42:6353-62.
- 2004
- Al-Sabi, A., D. Lennartz, M. Ferber, J. Gulyas, J.E. Rivier, B.M. Olivera, T. Carlomagno and H. Terlau (2004) κ M-Conotoxin RIIIK, structural and functional novelty in a K^+ antagonist. *Biochemistry* 43:8625-35.
- Boccaccio, A., F. Conti, B.M. Olivera and H. Terlau (2004) Binding of κ -conotoxin PVIIA to *Shaker* K^+ channels reveals different K^+ and Rb^+ occupancies within the ion channel pore. *J. Gen. Physiol.* 124:71-81.
- Buczek, O., B.M. Olivera and G. Bulaj (2004) Propeptide does not act as an intramolecular chaperone but facilitates protein disulfide isomerase-assisted folding of a conotoxin precursor. *Biochemistry* 43:1093-1101.
- Chi, S.W., D.H. Kim, B.M. Olivera, J.M. McIntosh and K.H. Han (2004) Solution conformation of α -conotoxin GIC, a novel potent antagonist of $\alpha 3\beta 2$ nicotinic acetylcholine receptors. *Biochem. J.* 380(Pt 2):347-52.
- Ellison, M., F. Gao, H.-L. Wang, S.M. Sine, J.M. McIntosh and B.M. Olivera (2004) α -Conotoxins ImI and ImII target distinct regions of the $\alpha 7$ nAChR and distinguish human nicotinic receptor subtypes. *Biochemistry* 43:16019-26.
- Ferber, M., A. Al-Sabi, M. Stocker, B.M. Olivera and H. Terlau (2004) Identification of a mammalian target of κ M-conotoxin RIIIK. *Toxicon* 43:915-21.
- Jimenez, E.C., M. Watkins and B.M. Olivera (2004) Multiple 6-bromotryptophan residues in a sleep-inducing peptide. *Biochemistry* 43:12343-48.
- Kang, J., W. Low, T. Norberg, J. Meisenhelder, K. Hansson, J. Stenflo, G.-P. Zhou, J. Imperial, B.M. Olivera, A.C. Rigby and A.G. Craig (2004) Total chemical synthesis and NMR characterization of the glycopeptide tx5a, a heavily posttranslationally modified conotoxin, reveals that the glycan structure is a-D-Gal-(1-3)-a-D-GalNAc. *Eur. J. Biochem.* 271:4939-49.
- Koch, E.D., B.M. Olivera, H. Terlau and F. Conti (2004) The binding of κ -conotoxin PVIIA and fast C-type inactivation of *Shaker* K^+ channels are mutually exclusive. *Biophys. J.* 86:191-209.
- López-Vera, E., E.P. Heimer de la Cotera, M. Mailló, J.R. Riesgo-Escovar, B.M. Olivera and M.B. Aguilar (2004) A novel structural class of toxins: the methionine-rich peptides from the venoms of turrid marine snails (Mollusca, Conoidea). *Toxicon* 43:365-74.
- Olivera, B.M. (2004) Evaluation of Philippine *Gemmula*. I. Forms Related to *G. speciosa* and *G. kieneri*. *Sci. Diliman* 16(1):1-14.
- Olivera, B.M. (2004) Larger forms in *Lophiotoma*: four new species described in the Philippines and three from elsewhere in the Indo-Pacific. *Sci. Diliman* 16(2):1-28.
- Santos A.D., J.M. McIntosh, D.R. Hillyard, L.J. Cruz and B.M. Olivera (2004) The A-superfamily of conotoxins: structural and functional divergence. *J. Biol. Chem.* 279:17596-606.
- Teichert, R.W., J. Rivier, J. Dykert, L. Cervini, J. Gulyas, G. Bulaj, M. Ellison and B.M. Olivera (2004) α A-Conotoxin OIVA defines a new α A-conotoxin subfamily of nicotinic acetylcholine receptor inhibitors. *Toxicon* 44:207-14.
- Terlau, H. and B.M. Olivera (2004) *Conus* venoms: a rich source of novel ion channel-targeted peptides. *Physiol. Rev.* 83:41-68.
- 2005
- Aguilar, M. B., Lopez-Vera, E., Imperial, J. S., Falcon, A., Olivera, B. M. & De La Cotera, E. P. (2005) Putative gamma-conotoxins in vermivorous cone snails: the case of *Conus delessertii*. *Peptides*, 26, 23-7.
- Aguilar, M. B., Lopez-Vera, E., Ortiz, E., Becerril, B., Possani, L. D., Olivera, B. M. & Heimer De La Cotera, E. P. (2005) A novel conotoxin from *Conus delessertii* with posttranslationally modified lysine residues. *Biochemistry*, 44, 11130-6.
- Azam, L., Dowell, C., Watkins, M., Stitzel, J. A., Olivera, B. M., and McIntosh, J. M. (2005). Alpha-conotoxin BuIA, a novel peptide from *Conus bullatus*, distinguishes among neuronal nicotinic acetylcholine receptors. *J Biol Chem* **280**, 80-7.
- Bayrhuber, M., Vijayan, V., Ferber, M., Graf, R., Korukottu, J., Imperial, J., Garrett, J. E., Olivera, B. M., Terlau, H., Zweckstetter, M. & Becker, S. (2005) Konkunitzin-S1 is the first member of a new Kunitz-type neurotoxin family. Structural and functional characterization. *J Biol Chem*, 280, 23766-70.
- Braga, M. C. V., Konno, K., Portaro, F. C. V., Carlos De Freitas, J., Yamane, T., Olivera, B. M. & Pimenta, D. C. (2005) Mass spectrometric and high performance liquid chromatography profiling of the venom of the Brazilian vermivorous mollusk *Conus regius*: feeding, behavior and identificatino of one novel conotoxin. *Toxicon*, 45, 113-22.
- Buczek, O., Bulaj, G., and Olivera, B. M. (2005). Conotoxins and the posttranslational modification of secreted gene products. *Cell Mol Life Sci* **62**, 3067-79.
- Buczek, O., Yoshikami, D., Bulaj, G., Jimenez, E. C., and Olivera, B. M. (2005). Post-translational amino acid isomerization: a functionally important D-amino acid in an excitatory peptide. *J Biol Chem* **280**, 4247-53.
- Buczek, O., Yoshikami, D., Watkins, M., Bulaj, G., Jimenez, E. C., and Olivera, B. M. (2005). Characterization of D-amino-acid-containing excitatory conotoxins and redefinition of the I-conotoxin superfamily. *Febs J* **272**, 4178-88.

- Bulaj, G., West, P. J., Garrett, J. E., Watkins, M., Zhang, M. M., Norton, R. S., Smith, B. J., Yoshikami, D., and Olivera, B. M. (2005). Novel conotoxins from *Conus striatus* and *Conus kinoshitai* selectively block TTX-resistant sodium channels. *Biochemistry* **44**, 7259-65.
- Chi, S. W., Lee, S. H., Kim, D. H., Kim, J. S., Olivera, B. M., McIntosh, J. M. & Han, K. H. (2005) Solution structure of alpha-conotoxin PIA, a novel antagonist of alpha6 subunit containing nicotinic acetylcholine receptors. *Biochem Biophys Res Commun*, 338, 1990-7.
- Corpuz, G. P., Jacobsen, R. B., Jimenez, E. C., Watkins, M., Walker, C., Colledge, C., Garrett, J. E., McDougal, O., Li, W., Gray, W. R., Hillyard, D. R., Rivier, J., McIntosh, J. M., Cruz, L. J., and Olivera, B. M. (2005). Definition of the M-conotoxin superfamily: characterization of novel peptides from molluscivorous *Conus* venoms. *Biochemistry* **44**, 8176-86.
- Fuller, E., Green, B. R., Catlin, P., Buczek, O., Nielsen, J. S., Olivera, B. M. & Bulaj, G. (2005) Oxidative folding of conotoxins sharing an identical disulfide bridging framework. *FEBS J*, 272, 1727-38.
- Garrett, J. E., Buczek, O., Watkins, M., Olivera, B. M. & Bulaj, G. (2005) Biochemical and gene expression analyses of conotoxins in *Conus textile* venom ducts. *Biochem Biophys Res Commun*, 328, 362-7.
- Leipold, E., Hansel, A., Olivera, B. M., Terlau, H. & Heinemann, S. H. (2005) Molecular interaction of delta-conotoxins with voltage-gated sodium channels. *FEBS Lett*, 579, 3881-4.
- McIntosh, J. M., Plazas, P. V., Watkins, M., Gomez-Casati, M. E., Olivera, B. M., and Elgoyhen, A. B. (2005). A novel alpha-conotoxin, PeIA, cloned from *Conus pergrandis*, discriminates between rat alpha9alpha10 and alpha7 nicotinic cholinergic receptors. *J Biol Chem* **280**, 30107-12.
- Teichert, R. W., Rivier, J., Torres, J., Dykert, J., Miller, C., and Olivera, B. M. (2005). A uniquely selective inhibitor of the mammalian fetal neuromuscular nicotinic acetylcholine receptor. *J Neurosci* **25**, 732-6.
- Teichert, R. W., Jimenez, E. C., and Olivera, B. M. (2005). Alpha S-conotoxin RVIIIA: a structurally unique conotoxin that broadly targets nicotinic acetylcholine receptors. *Biochemistry* **44**, 7897-902.
- Verdier, L., Al-Sabi, A., Rivier, J. E., Olivera, B. M., Terlau, H. & Carlomagno, T. (2005) Identification of a novel pharmacophore for peptide toxins interacting with K⁺ channels. *J Biol Chem*, 280, 21246-55.
- 2006
- Bandyopadhyay, P. K., Clark, K., Stevenson, B. J., Rivier, J. E., Olivera, B. M., Golic, K. G., and Rong, Y. S. (2006). Biochemical characterization of *Drosophila* gamma-glutamyl carboxylase and its role in fly development. *Insect Mol Biol* **15**, 147-56.
- Bandyopadhyay, P. K., Stevenson, B. J., Cady, M. T., Olivera, B. M., and Wolstenholme, D. R. (2006). Complete mitochondrial DNA sequence of a Conoidean gastropod, *Lophiotoma* (*Xenuroturrus*) *cerithiformis*: gene order and gastropod phylogeny. *Toxicon* **48**, 29-43.
- Bayrhuber, M., Graf, R., Ferber, M., Zweckstetter, M., Imperial, J., Garrett, J.E., Olivera, B.M., Terlau, H., Becker, S. (2006). Production of recombinant Conkunitzin-S1 in *Escherichia coli*. *Protein Expression and Purification* **47**, 640-644.
- Bulaj, G., Zhang, M. M., Green, B. R., Fiedler, B., Layer, R. T., Wei, S., Nielsen, J. S., Low, S. J., Klein, B. D., Wagstaff, J. D., Chicoine, L., Harty, T. P., Terlau, H., Yoshikami, D., and Olivera, B. M. (2006). Synthetic muO-conotoxin MrVIB blocks TTX-resistant sodium channel NaV1.8 and has a long-lasting analgesic activity. *Biochemistry* **45**, 7404-14.
- Chi SW, Kim DH, Olivera BM, McIntosh JM, Han KH. (2006) NMR structure determination of alpha-conotoxin BuIA, a novel neuronal nicotinic acetylcholine receptor antagonist with an unusual 4/4 disulfide scaffold. *Biochem Biophys Res Commun*. 349(4):1228-34.
- Ellison, M., Haberlandt, C., Gomez-Casati, M. E., Watkins, M., Elgoyhen, A. B., McIntosh, J. M. and Olivera, B. M. (2006) Alpha-RgIA: a novel conotoxin that specifically and potently blocks the alpha9alpha10 nAChR. *Biochemistry*, **45**, 1511-7.
- Imperial, J. S., Bansal, P. S., Alewood, P. F., Daly, N. L., Craik, D. J., Sporning, A., Terlau, H., Lopez-Vera, E., Bandyopadhyay, P. K., and Olivera, B. M. (2006). A novel conotoxin inhibitor of Kv1.6 channel and nAChR subtypes defines a new superfamily of conotoxins. *Biochemistry* **45**, 8331-40.
- Norton R. S. and Olivera B.M. (2006). Conotoxins down under. *Toxicon* **48**, 780-798
- Olivera, B. M. (2006). *Conus* peptides: biodiversity-based discovery and exogenomics. *J Biol Chem* **281**, 31173-7.
- Teichert, R. W., Lopez-Vera, E., Gulyas, J., Watkins, M., Rivier, J., and Olivera, B. M. (2006). Definition and characterization of the short alphaA-conotoxins: a single residue determines dissociation kinetics from the fetal muscle nicotinic acetylcholine receptor. *Biochemistry* **45**, 1304-12.
- Vincler, M., Wittenauer, S., Parker, R., Ellison, M., Olivera, B. M. & McIntosh, J. M. (2006) Molecular mechanism for analgesia involving specific antagonism of alpha9alpha10 nicotinic acetylcholine receptors. *Proc Natl Acad Sci U S A*, **103**, 17880-4.
- Watkins, M., Hillyard, D. R., and Olivera, B. M. (2006). Genes expressed in a turrid venom duct: divergence and similarity to conotoxins. *J Mol Evol* **62**, 247-56.
- Zhang, M. M., Fiedler, B., Green, B. R., Catlin, P., Watkins, M., Garrett, J. E., Smith, B. J., Yoshikami, D., Olivera, B. M., and Bulaj, G. (2006). Structural and functional diversities among mu-conotoxins targeting TTX-resistant sodium channels. *Biochemistry* **45**, 3723-32.
- Zorn, S., Leipold, E., Hansel, A., Bulaj, G., Olivera, B.M., Terlau, H., and Heinemann, S.H. (2006). The muO-conotoxin MrVIA inhibits voltage-gated sodium channels by associating with domain-3. *FEBS Letters* **580**, 1360-1364.

- Zugasti-Cruz, A., Maillo, M., Lopez-Vera, E., Falcon, A., Heimer De La Cotera, E. P., Olivera, B. M. and Aguilar, M. B. (2006) Amino acid sequence and biological activity of a gamma-conotoxin-like peptide from the worm-hunting snail *Conus austini*. *Peptides*, **27**, 506-11.
- 2007
- Aguilar, M.B., Lopez-Vera, E., Heimer de la Cotera, E.P., Falcon A., Olivera B.M., & Maillo, (2007) M. I-conotoxins in vermivorous species of the West Atlantic: Peptide sr11a from *Conus spuriosus*. *Peptides*, **28** (1), 18-23.
- Biggs, J., Rosenfeld, Y., Shai, Y., and Olivera, B. M. (2007) Conolysin-Mt: A Conus Peptide that Disrupts Cellular Membranes. *Biochemistry* **46**, **44**, 12586-12593
- Buczek, O., Wei, D., Babon, J. J., Yang, X., Fiedler, B., Yoshikami, D., Olivera, B. M., Bulaj, G., and Norton, R. S. (2007) Structure and Sodium Channel Activity of an Excitatory II-Superfamily Conotoxin. *Biochemistry*, **46**, 9929-9940.
- Buczek, O., Green, B. R. & Bulaj, G. (2007) Albumin is a redox-active crowding agent that promotes oxidative folding of cysteine-rich peptides. *Biopolymers*, **88**, 8-19.
- Ellison, M. & Olivera, B. M. (2007) $\alpha/3$ Conotoxins: Phylogenetic Distribution, Functional Properties and Structure-Function. *The Chemical Record*, **7**, 341-353.
- Green, B. R., Catlin, P., Zhang, M. M., Fiedler, B., Bayudan, W., Morrison, A., Norton, R. S., Smith, B. J., Yoshikami, D., Olivera, B. M., and Bulaj, G. (2007) Conotoxins containing nonnatural backbone spacers: cladistic-based design, chemical synthesis, and improved analgesic activity. *Chem Biol* **14**, 399-407.
- Heralde III, F. M., M. Watkins, J.-P. Ownby, P. Bandyopadhyay, A. D. Santos, G. P. Concepcion, and B. M. Olivera. (2007). Molecular Phylogeny of Some Indo-Pacific Genera in the Subfamily Turrinae H. Adams and A. Adams, 1853 (1838). *Nautilus*, **121**(3), 131-138.
- Imperial, J., Kantor, Y., Watkins, M., Heralde, F., Stevenson, B. J., Chen, P., Ownby, J.-P., Bouchet, P., and Olivera, B. M. (2007) The Venomous Auger Snail *Hastula (impages) heciticca* (Linnaeus, 1758): Molecular Phylogeny, Foregut Anatomy and Comparative Toxinology. *Journal of Experimental Zoology*, **308 B**: 744-756.
- Imperial, J. S., Silverton, N., Olivera, B. M., Bandyopadhyay, P. K., Sporning, A., Ferber, M., and Terlau, H. (2007) Using Chemistry to Reconstruct Evolution: On the Origins of Fish-hunting in Venomous Cone Snails. *Proc American Philosophical Society*, **151**, 185-200.
- Jimenez, E. C., B. M. Olivera, and R. W. Teichert. (2007). α C-Conotoxin PrXA: A New Family of Nicotinic Acetylcholine Receptor Antagonists. *Biochemistry*, **46**(30); 8717-8724.
- Leipold, E., De Bie, H., Zorn, S., Borges, A., Olivera, B. M., Terlau, H. & Heinemann, S. H. (2007) μ O-Conotoxins Inhibit Na_v Channels by Interfering with their Voltage Sensors in Domain-2. *Channels* **1**;4, 253-262
- Lopez-Vera, E., Jacobsen, R. B., Ellison, M., Olivera, B. M., and Teichert, R. W. (2007) A novel alpha conotoxin (alpha-PIB) isolated from *C. purpurascens* is selective for skeletal muscle nicotinic acetylcholine receptors. *Toxicon*. **49**(8):1193-9
- Luna-Ramirez, K. S., Aguilar, M. B., Falcon, A., Heimer de la Cotera, E. P., Olivera, B. M., and Maillo, M. (2007) An O-conotoxin from the vermivorous *Conus spuriosus* active on mice and mollusks. *Peptides* **28**, 24-30.
- Olivera, B.M., and Teichert, R.W. (2007) Diversity of the Neurotoxic Conus Peptides. *Molecular Interventions* **7**(5): 251-260.
- Teichert, R. W., Jacobsen, R., Terlau, H., Yoshikami, D., and Olivera, B. M. (2007). Discovery and characterization of the short kappaA-conotoxins: a novel subfamily of excitatory conotoxins. *Toxicon* **49**, 318-28.
- Teichert, R. W., Jimenez, E., & Olivera, B. M. (2007) Biology and Pharmacology of Conotoxins. IN JANKOVIC, J. (Ed.) *Botulinum and other Neurotoxins: Translating Science Into Therapeutic Applications*, **36**, 446-464 New York, NY, Neurotoxin Institute.
- Teichert, R. W. & Olivera, B. M. (2007) Novel Pain Therapies from Marine Toxins. IN WALSH, P. A., SMITH, S. L., FLEMING, L. E., SOLO-GABRIELE, H. & GERWICK, W. H. (Eds.) *Oceans and Human Health: Risks and Remedies from the Seas*, **25**, P372584 indd 495. San Diego, CA, Academic Press.
- Teichert, R.W., Jimenez, E.C., Twede, V., Watkins, M., Hollmann, M., Bulaj, G., Olivera, B.M. (2007) Novel Conantokins from *Conus parvus* Venom are Specific Antagonists of N-Methyl-D-aspartate Receptors. *J Biol Chem*, **282**: 36905-36913.
- Whiteaker, P., Christensen, S., Yoshikami, D., Dowell, C., Watkins, M., Gulyas, J., Rivier, J., Olivera, B. M., and McIntosh, J. M. (2007) Discovery, Synthesis, and Structure Activity of a Highly Selective alpha7 Nicotinic Acetylcholine Receptor Antagonist. *Biochemistry*. **46**(22):6628-38
- Zhang, M. M., Green, B. R., Catlin, P., Fiedler, B., Azam, L., Chadwick, A., Terlau, H., McArthur, J. R., French, R. J., Gulyas, J., Rivier, J. E., Smith, B. J., Norton, R. S., Olivera, B. M., Yoshikami, D., and Bulaj, G. (2007) Structure/Function Characterization of μ -Conotoxin KIIIA, An Irreversible Blocker of a Neuronal Subtype of Mammalian Sodium Channel. *J Biol Chem*, **282**: 30699 - 30706.
- 2008
- Aguilar, M. B., Luna-Ramirez, K. S., Echeverria, D., Falcon, A., Olivera, B. M., Heimer de la Cotera, E. P., and Maillo, M. (2008). Conorfamide-Sr2, a gamma-carboxyglutamate-containing FMRFamide-related peptide from the venom of *Conus spuriosus* with activity in mice and mollusks. *Peptides* **29**(2), 186-195.
- Bandyopadhyay, P. K., Stevenson, B. J., Ownby, J. P., Cady, M. T., Watkins, M., & Olivera, B. M. (2008). The mitochondrial genome of *Conus textile*, coxI-coxII intergenic sequences and Conoidean evolution. *Mol Phylogenet Evol* **46**(1), 215-223.
- Biggs, J. S., Olivera, B. M., & Kantor, Y. I. (2008). Alpha-conopeptides specifically expressed in the salivary gland of *Conus pulcherrimus*. *Toxicon* **52**(1), 101-105.

- Buczek, O., Jimenez, E. C., Yoshikami, D., Imperial, J. S., Watkins, M., Morrison, A., and Olivera, B. M. (2008). I(1)-superfamily conotoxins and prediction of single D-amino acid occurrence. *Toxicon* 51(2), 218-229.
- Bulaj, G., & Olivera, B. M. (2008). Folding of conotoxins: formation of the native disulfide bridges during chemical synthesis and biosynthesis of Conus peptides. *Antioxid Redox Signal* 10(1), 141-155.
- Chen, P., Garrett, J. E., Watkins, M., & Olivera, B. M. (2008). Purification and characterization of a novel excitatory peptide from *Conus distans* venom that defines a novel gene superfamily of conotoxins. *Toxicon* 52(1), 139-145.
- Ellison, M., Feng, Z. P., Park, A. J., Zhang, X., Olivera, B. M., McIntosh, J. M., and Norton, R. S. (2008). Alpha-RgIA, a novel conotoxin that blocks the alpha9alpha10 nAChR: structure and identification of key receptor-binding residues. *J Mol Biol* 377(4), 1216-1227.
- Espino, S.S., Kohn, A.J., Villanueva, J.A., Heralde III, F.M., Corneli, P.S., Concepcion, G.P. Olivera, B.M., Santos, A.D. (2008). Feeding behavior, phylogeny, and toxinology of *Conus furvus* Reeve, 1843 (Gastropoda: Neogastropoda: Conidae). *The Nautilus* 122(3): 143-150.
- Fiedler, B., Zhang, M. M., Buczek, O., Azam, L., Bulaj, G., Norton, R. S., Olivera, B. M., and Yoshikami, D. (2008). Specificity, affinity and efficacy of iota-conotoxin RXIA, an agonist of voltage-gated sodium channels Na(V)1.2, 1.6 and 1.7. *Biochem Pharmacol* 75(12), 2334-2344.
- Gowd, K. H., Twede, V., Watkins, M., Krishnan, K. S., Teichert, R. W., Bulaj, G., and Olivera, B. M. (2008). Conantokin-P, an unusual conantokin with a long disulfide loop. *Toxicon* 52(2), 203-213.
- Han, T. S., Teichert, R. W., Olivera, B. M., & Bulaj, G. (2008). Conus venoms - a rich source of peptide-based therapeutics. *Curr Pharm Des* 14(24), 2462-2479.
- Heralde, F. M., 3rd, Imperial, J., Bandyopadhyay, P. K., Olivera, B. M., Concepcion, G. P., & Santos, A. D. (2008). A rapidly diverging superfamily of peptide toxins in venomous *Gemmula* species. *Toxicon* 51(5), 890-897.
- Imperial, J. S., Chen, P., Sporning, A., Terlau, H., Daly, N. L., Craik, D. J., Alewood, P. F., and Olivera, B. M. (2008). Tyrosine-rich conopeptides affect voltage-gated K⁺ channels. *J Biol Chem* 283(34), 23026-23032.
- Kantor, Y.I., Puillandre, N., Olivera, B.M., and Bouchet, P., (2008). Morphological Proxies for Taxonomic Decision in Turrids (Mollusca, Neogastropoda): Test of the Value of Shell and Radula Characters Using Molecular Data. *Zoological Science* 25: 000-000.
- Liu, Y., Padgett, D., Takahashi, M., Li, H., Sayeed, A., Teichert, R. W., Olivera, B. M., McArdle, J. J., Green, W. N., and Lin, W. (2008). Essential roles of the acetylcholine receptor gamma-subunit in neuromuscular synaptic patterning. *Development* 135(11), 1957-1967.
- Lluisma, A. O., Lopez-Vera, E., Bulaj, G., Watkins, M., & Olivera, B. M. (2008). Characterization of a novel psi-conotoxin from *Conus parius* Reeve. *Toxicon* 51(2), 174-180.
- Lopez-Vera, E., Walewska, A., Skalicky, J. J., Olivera, B. M., & Bulaj, G. (2008). Role of hydroxyprolines in the in vitro oxidative folding and biological activity of conotoxins. *Biochemistry* 47(6), 1741-1751.
- Olivera, B. M., Quik, M., Vincler, M., & McIntosh, J. M. (2008). Subtype-selective conopeptides targeted to nicotinic receptors: Concerted discovery and biomedical applications. *Channels (Austin)* 2(2) 143-152.
- Olivera, B. M., Hillyard, D.R., and Watkins, M. (2008). A new species of *Gemmula*, Weinkauff 1875; Evidence of two clades of Philippine species in the genus *Gemmula*. *Philippine Science Letters* 1 (1) 11-15.
- Oppenheim, R. W., Caldero, J., Cuitat, D., Esquerda, J., McArdle, J. J., Olivera, B. M., Prevet, D., and Teichert, R. W. (2008). The rescue of developing avian motoneurons from programmed cell death by a selective inhibitor of the fetal muscle-specific nicotinic acetylcholine receptor. *Dev Neurobiol* 68(7), 972-980.
- Teichert, R. W., Jimenez, E., & Olivera, B. M. (2008) Biology and Pharmacology of Conotoxins. IN JANKOVIC, J. (Ed.) *Botulinum and other Neurotoxins: Translating Science Into Therapeutic Applications*, 36, 446-464 New York, NY, Neurotoxin Institute.
- Teichert, R. W., Garcia, C. C., Potian, J. G., Schmidt, J. J., Witzemann, V., Olivera, B. M., and McArdle, J. J. (2008). Peptide-toxin tools for probing the expression and function of fetal and adult subtypes of the nicotinic acetylcholine receptor. *Ann N Y Acad Sci* 1132, 61-70.
- Walewska, A., Skalicky, J. J., Davis, D. R., Zhang, M. M., Lopez-Vera, E., Watkins, M., Han, T. S., Yoshikami, D., Olivera, B. M., and Bulaj, G. (2008). NMR-based mapping of disulfide bridges in cysteine-rich peptides: application to the mu-conotoxin SxIIIa. *J Am Chem Soc* 130(43), 14280-14286.
- Yao, S., Zhang, M. M., Yoshikami, D., Azam, L., Olivera, B. M., Bulaj, G., and Norton, R. S. (2008). Structure, dynamics, and selectivity of the sodium channel blocker mu-conotoxin SIIIa. *Biochemistry* 47(41), 10940-10949.
- Zugasti-Cruz, A., Aguilar, M. B., Falcon, A., Olivera, B. M., & Heimer de la Cotera, E. P. (2008). Two new 4-Cys conotoxins (framework 14) of the vermivorous snail *Conus austini* from the Gulf of Mexico with activity in the central nervous system of mice. *Peptides* 29(2), 179-185.
- 2009
- Aguilar, M. B., de la Rosa, R. A., Falcon, A., Olivera, B. M., & Heimer de la Cotera, E. P. (2009). Peptide pal9a from the venom of the turrid snail *Polystira albida* from the Gulf of Mexico: Purification, characterization, and comparison with P-conotoxin-like (framework IX) conoidean peptides. *Peptides* 30(3), 467-476.

- Han, T. S., Zhang, M. M., Walewska, A., Gruszczynski, P., Robertson, C. R., Cheatham, T. E., 3rd, Yoshikami, D., Olivera, B. M., and Bulaj, G., (2009). Structurally minimized mu-conotoxin analogues as sodium channel blockers: implications for designing conopeptide-based therapeutics. *ChemMedChem* 4(3), 406-414.
- Holford, M., Puillandre, N., Terryn, Y., Cruaud, C., Olivera, B., & Bouchet, P. (2009). Evolution of the Toxoglossa venom apparatus as inferred by molecular phylogeny of the Terebridae. *Mol Biol Evol* 26(1), 15-25.
- Holford, M., Zhang, M. M., Gowd, K. H., Azam, L., Green, B. R., Watkins, M., Ownby, J. P., Yoshikami, D., Bulaj, G., and Olivera, B. M., (2009). Pruning nature: Biodiversity-derived discovery of novel sodium channel blocking conotoxins from *Conus bullatus*. *Toxicon* 53(1), 90-98.
- Holford, M., Puillandre, N., Modica, M.V., Watkins, M., Collin, R., Bermingham, E., Olivera, B.M. (2009). Correlating Molecular Phylogeny with Venom Apparatus Occurrence in Panamic Auger Snails (Terebridae). *PLoS One* 4(11): e7667.
- Khoo, K. K., Feng, Z. P., Smith, B. J., Zhang, M. M., Yoshikami, D., Olivera, B. M., Bulaj, G., and Norton, R. S., (2009). Structure of the Analgesic mu-Conotoxin KIIIA and Effects on the Structure and Function of Disulfide Deletion (†) (††). *Biochemistry*. 48(6):1210-9.
- Lee, H. K., Zhang, L., Smith, M. D., White, H. S., & Bulaj, G. (2009). Glycosylated neurotensin analogues exhibit sub-picomolar anticonvulsant potency in a pharmaco-resistant model of epilepsy. *ChemMedChem* 4(3), 400-405.
- Peraud, O., Biggs, J. S., Hughen, R. W., Light, A. R., Concepcion, G. P., Olivera, B. M., and Schmidt, E. W., 2009, Microhabitats within venomous cone snails contain diverse actinobacteria. *Appl Environ Microbiol* 75(21):6820-6.
- Twede, V. D., Miljanich, G., Olivera, B. M., & Bulaj, G. (2009). Neuroprotective and cardioprotective conopeptides: an emerging class of drug leads. *Curr Opin Drug Discov Devel* 12(2), 231-239.
- Twede, V. D., Teichert, R. W., Walker, C. S., Gruszczynski, P., Kazmierkiewicz, R., Bulaj, G., and Olivera, B. M. (2009). Conantokin-Br from *Conus brethinghami* and selectivity determinants for the NR2D subunit of the NMDA receptor. *Biochemistry* 48(19), 4063-4073.
- Walewska, A., Zhang, M. M., Skalicky, J. J., Yoshikami, D., Olivera, B. M., & Bulaj, G. (2009). Integrated oxidative folding of cysteine/selenocysteine containing peptides: improving chemical synthesis of conotoxins. *Angew Chem Int Ed Engl* 48(12), 2221-2224.
- Walker, C. S., Jensen, S., Ellison, M., Matta, J. A., Lee, W. Y., Imperial, J. S., Duclos, N., Brockie, P. J., Madsen, D. M., Isaac, J. T. R., and Olivera, B. M. (2009). A Novel *Conus* Snail Polypeptide Causes Excitotoxicity by Blocking Desensitization of AMPA Receptors. *Current Biology* 19, 1-9.
- Zhang, M. M., McArthur, J. R., Azam, L., Bulaj, G., Olivera, B. M., French, R. J., and Yoshikami, D. (2009). Synergistic and antagonistic interactions between tetrodotoxin and mu-conotoxin in blocking voltage-gated sodium channels. *Channels (Austin)* 3(1), 32-38.
- 2010
- Biggs, J. S., Watkins, M., Showers Corneli, P., & Olivera, B. M. (2010) Defining a Clade by Morphological, Molecular and Toxinological Criteria: Distinctive Forms related to *Conus praecellens* A. Adams, 1854†. *Nautilus*. 124(1):1-19.
- Biggs, J.S., Watkins, M., Puillandre, N., Ownby, J.P., Lopez-Vera, E., Christensen, S., Moreno, K.J., Navarro, A.L., Corneli Showers, P., Olivera, B.M. (2010) Evolution of conus peptide toxins: Analysis of *Conus californicus* Reeve, 1844. *Molecular Phylogenetics and Evolution* 56, 1-12.
- Fedosov A, Watkins M, Heralde FM, 3rd, Showers Corneli P, Concepcion GP, Olivera BM. (2011) Phylogeny of the Genus *Turris*: Correlating Molecular Markers with Radular Anatomy and Shell Morphology. *Mol Phylogenet Evol* 59(2):263-70.
- French, R.J., Yoshikami, D., Sheets, M.F., and Olivera, B.M., (2010) The Tetrodotoxin Receptor of Voltage-Gated Sodium Channels—Perspectives from Interactions with μ -Conotoxins. *Marine Drugs* 8(7):2153-2161.
- Gowd, K. H., Watkins, M., Twede, V. D., Bulaj, G., and Olivera, B. M. (2010) Characterization of Conantokin *Rl-A*: Molecular Phylogeny as Structure/Function Study. *Journal of Peptide Science* 16(8):375-82.
- Jimenez E.C., Olivera, B.M. (2010) Divergent M- and O-superfamily peptides from venom of fish-hunting *Conus parius*. *Peptides* 31(9):1678-83.
- Lin, Z., Antemano R.R., Hughen, R.W., Tianero, M.D., Peraud, O., Haygood, M.G., Concepcion, G.P., Olivera, B.M., Light, A., Schmidt, E.W. (2010) Pulicatins A-E, neuroactive thiazoline metabolites from cone snail-associated bacteria. *J Nat Prod*. 73(11):1922-6.
- Mayer AM, Glaser KB, Cuevas C, Jacobs RS, Kem W, Little RD, McIntosh JM, Newman DJ, Potts BC, Shuster DE. (2010) The odyssey of marine pharmaceuticals: a current pipeline perspective. *Trends Pharmacol Sci*. (6):255-65.
- Ping Chen, Andreas Dendorfer, Rocio K. Finol-Urdaneta, Heinrich Terlau, and Baldomero M. Olivera. (2010) Biochemical Characterization of kappaM-R111J, a Kv1.2 Channel Blocker. *J Biol Chem* 285(20):14882-9.
- Puillandre N., Sysoev AV., Olivera B.M., Couloux A. and Bouchet P. (2010) Loss of planktotrophy and speciation: geographical fragmentation in the deep-water gastropod genus *Bathytoma* (Gastropods, Conoidea) in the western Pacific. *Systematics and Biodiversity* 8(3): 371-394.
- Puillandre N., Watkins M., and Olivera B.M. Evolution of *Conus* Peptide Genes: Duplication and Positive Selection in the A-Superfamily, *J Mol Evol* (2010) doi:10.1007/s00239-010-9321-7 (available online).

- Safavi-Hemami, H., Bulaj, G., Olivera, B.M., Williamson, N.A., Purcell, A.W. (2010) Identification of Conus peptidylprolyl Cis-Trans Isomerases (PPases) and Assessment of Their Role in the Oxidative Folding of Conotoxins. *J Biol Chem* 285(17):12735-12746.
- Seronay, R.A., Fedosov, A. E., Astilla; M. A. Q., Watkins, M., Saguil, N., Heralde III, F. M., Tagaro, S., Poppe, G. T., Alino, P. M., Oliverio, M., Kantor, Y., Concepcion, G. P., and Olivera, B. M. (2010) Accessing novel conoidean venoms: Biodiverse lumun-lumun marine communities, an untapped biological and toxinological resource, *Toxicon* 56(7):1257-1266.
- Teichert, R.W. and Olivera, B.M. (2010) Natural Products and Ion Channel Pharmacology. *Future Medicinal Chemistry*, 2(5), 731-744.
- Watkins M., Showers Corneli P., Hillyard D., Olivera B.M. (2010) Molecular phylogeny of *Conus chiangi* (Azuma, 1972) (Gastropoda: Conidae). *124(3):129-136*.
- Zhang M., Gruszczynski P., Walewska A., Bulaj G., Olivera B.M. and Yoshikami D. (2010) Cooccupancy of the Outer Vestibule of Voltage-Gated Sodium Channels by μ -Conotoxin KIIIA and Saxitoxin or Tetrodotoxin. *J. Neurophysiol* 104: 88-97.
- Zhang, M.M., Han, T.S., Olivera, B.M., Bulaj, G., and Yoshikami, D., 2010b. Mu-conotoxin KIIIA derivatives with divergent affinities versus efficacies in blocking voltage-gated sodium channels. *Biochemistry* (49):4804-12.
- 2011
- Anderson, W.A., Banerjee, U., Drennan, C.L., Elgin, S.C., Epstein, I.R., Handsman, J., Hatfull, G.F., Losick, R., O'Dowd, D.K., Olivera, B.M., Strobel, S.A., Walder, G.C., Warner, I.M. (2011) Science education: Changing the culture of science education at research universities. *Science* 331(6014): 152-3.
- Cabang, A.B., Imperial, J.S., Gajewiak, J., Watkins, M., Showers Corneli, P., Olivera, B.M., and Concepcion, G.P. (2011) Characterization of a Venom Peptide from a Crassispirid Gastropod, *Toxicon*. 58(8):672-80.
- Fedosov, A., Watkins, M., Heralde, F.M. (2011) Phylogeny of the genus Turris: Correlating molecular data with radular anatomy and shell morphology. *Molecular Phylogenetics & Evolution* 59(2):263-70.
- Gowd, K. H., Yarotsky, V., Elmslie, K. S., Skalicky, J. J., Olivera, B. M., and Bulaj, G. (2011) Site-specific Effects of Diselenide Bridges on the Oxidative Folding of a Cysteine Knot Peptide, ω -Selenoconotoxin GVIA. *Biochemistry* 49(12):2741-2752.
- Hu H, Bandyopadhyay PK, Olivera BM, Yandell M. 2011. (2011) Characterization of the *Conus bullatus* genome and its venom-duct transcriptome. *BMC Genomics* 12:60.
- Kraus NJ, Corneli PS, Watkins M, Bandyopadhyay PK, Seger J, Olivera BM. (2011) Against expectation: a short sequence with high signal elucidates cone snail phylogeny. *Mol Phylogenet Evol* 58(2):383-9.
- Lin Z, Reilly CA, Antemano R, Hughen RW, Marett L, Concepcion GP, Haygood MG, Olivera BM, Light A, Schmidt EW. (2011) Nobilamides A-H, long-acting transient receptor potential vanilloid-1 (TRPV1) antagonists from mollusk-associated bacteria. *J Med Chem*. 54(11):3746-55.
- Olivera BM, Teichert RW. (2011) Neuroscience: chemical ecology of pain. *Nature*. Nov 16;479(7373):306-7.
- Puillandre, N., Meyer, C. P., Bouchet, P. & Olivera, B. (2011) Genetic Divergence and Geographic Variation in the deep-water *Conus* Orbigny Complex (Mollusca: Conoidea). *Zoological Scripta* 40(4):350-363.
- Teichert, R.W., Smith, N.J., Raghuraman, S., Malcolm, R.J., Yoshikami, D., Light, A.R., and Olivera, B.M. (2012) Functional profiling of neurons through cellular neuropharmacology. *PNAS* 109(5):1388-1395.
- Wilson MJ, Yoshikami D, Azam L, Gajewiak J, Olivera BM, Bulaj G, Zhang MM (2011) Block of sodium channels Nav1.1-1.8 by a panel of μ -conotoxins: Identity of channels responsible for action potentials in sciatic nerve. *Proc. Natl. Acad. Sci.* 108(25):10302-7.
- Wilson MJ, Zhang MM, Azam L, Olivera BM, Bulaj G, and Yoshikami D (2011) Nav β subunits modulate the inhibition of Nav1.8 by the analgesic gating modifier μ O-conotoxin MrVIB. *J. Pharmacol. Exp. Ther.* 338(2):687-93.
- Wilson MJ, Yoshikami D, Azam L, Gajewiak J, Olivera BM, Bulaj G, Zhang MM. (2011) μ -Conotoxins that differentially block sodium channels Nav1.1 through 1.8 identify those responsible for action potentials in sciatic nerve. *Proc Natl Acad Sci USA* 108(25):10302-7.
- Zheng G, Zhang Z, Dowell C, Wala E, Dwoskin LP, Holtman JR, McIntosh JM, Crooks PA. (2011) Discovery of non-peptide, small molecule antagonists of α 9a10 nicotinic acetylcholine receptors as novel analgesics for the treatment of neuropathic and tonic inflammatory pain. *Bioorg Med Chem Lett*. 21(8):2476-9.
- 2012
- Arnison PG, Bibb MJ, Bierbaum G, Bowers AA, Bugni TS, Bulaj G, Camarero JA, Campopiano DJ, Challis GL, Clardy J, Cotter PD, Craik DJ, Dawson M, Dittmann E, Donadio S, Dorrestein PC, Entian KD, Fischbach MA, Garavelli JS, Göransson U, Gruber CW, Haft DH, Hemscheidt TK, Hertweck C, Hill C, Horswill AR, Jaspars M, Kelly WL, Klinman JP, Kuipers OP, Link AJ, Liu W, Marahiel MA, Mitchell DA, Moll GN, Moore BS, Müller R, Nair SK, Nes IF, Norris GE, Olivera BM, Onaka H, Patchett ML, Piel J, Reaney MJ, Rebuffat S, Ross RP, Sahl HG, Schmidt EW, Selsted ME, Severinov K, Shen B, Sivonen K, Smith L, Stein T, Süßmuth RD, Tagg JR, Tang GL, Truman AW, Vederas JC, Walsh CT, Walton JD, Wenzel SC, Willey JM, van der Donk WA. (2012) Ribosomally synthesized and post-translationally modified peptide natural products: overview and recommendations for a universal nomenclature. *Nat Prod Rep*. 30(1):108-60.
- Gowd, K.H., Han, T.S., Twede, V.D., Gajewiak, J., Smith, M.D., Watkins, M., Platt, R.J., Toledo, G., White, S., Olivera, B.M., Bulaj, G. (2012) Conantokins Derived from the *Asprella* Clade: ConR1-B, and NMDA Receptor Antagonist with a Unique Selectivity Profile for NR2B Subunits. *Biochemistry* 51(23):4685-92.

- Gowd KH, Blais KD, Elmslie KS, Steiner AM, Olivera BM, Bulaj G. (2012) Dissecting a role of evolutionary-conserved but noncritical disulfide bridges in cysteine-rich peptides using ω -conotoxin GVIA and its selenocysteine analogs. *Biopolymers* 98(3):212-23.
- Hu H, Bandyopadhyay PK, Olivera BM, Yandell M. (2012) Elucidation of the molecular envenomation strategy of the cone snail *Conus geographus* through transcriptome sequencing of its venom duct. *BMC Genomics*. 13:284.
- Khoo KK, Gupta K, Green BR, Zhang MM, Watkins M, Olivera BM, Balaram P, Yoshikami D, Bulaj G, Norton RS. (2012) Distinct Disulfide Isomers of μ -Conotoxins KIIIA and KIIIB Block Voltage-Gated Sodium Channels. *Biochemistry* 51(49):9826-35.
- Kilburn, R.N., Fedosov, A.E., Olivera, B.M. (2012) Revision of the genus *Turris* Batsch, 1789 (Gastropoda: Conoidea: Turridae) with the description of six new species. *Zootaxa*. NIHMSID # 356520
- Kraus NJ, Watkins M, Bandyopadhyay PK, Seger J, Olivera BM, Corneli PS. (2012) A very short, functionally constrained sequence diagnoses cone snails in several *Conasprella* clades. *Mol Phylogenet Evol.* 65(1):335-8
- Lin Z, Flores M, Forteza I, Henriksen NM, Concepcion GP, Rosenberg G, Haygood MG, Olivera BM, Light AR, Cheatham TE 3rd, Schmidt EW. (2012) Totopotensamides, polyketide-cyclic peptide hybrids from a mollusk-associated bacterium *Streptomyces* sp. *J Nat Prod.* 75(4):644-9.
- Lluisma, A.O., Milash, B.A., Moore, B., Olivera, B.M., Bandyopadhyay, P.K. (2012) Novel venom peptides from the cone snail *Conus pulicarius* discovered through next-generation sequencing of its venom duct transcriptome. *Marine Genomics* 5:43–51.
- Olivera BM, Watkins M, Bandyopadhyay P, Imperial JS, de la Cotera EP, Aguilar MB, Vera EL, Concepcion GP, Lluisma A. (2012) Adaptive radiation of venomous marine snail lineages and the accelerated evolution of venom peptide genes. *Ann N Y Acad Sci.* 1267:61-70.
- Olivera BM. (2012) QnAs with Baldomero M. Olivera. Interview by Beth Azar. *Proc Natl Acad Sci U S A.*109(34):13470.
- Platt RJ, Han TS, Green BR, Smith MD, Skalicky J, Gruszczynski P, White HS, Olivera B, Bulaj G, Gajewiak J. (2012) Stapling mimics noncovalent interactions of γ -carboxylglutamates in conantokins, peptidic antagonists of N-methyl-D-aspartic acid receptors. *J Biol Chem.* 287(24):20727-36.
- Safavi-Hemami H, Gorasia DG, Steiner AM, Williamson NA, Karas JA, Gajewiak J, Olivera BM, Bulaj G, Purcell AW. (2012) Modulation of conotoxin structure and function is achieved through a multienzyme complex in the venom glands of cone snails. *J Biol Chem.* 287(41):34288-303.
- Singer H, Erhardt M, Steiner A, Zhang MM, Yoshikami D, Bulaj G, Olivera BM, Hughes KT. (2012) Selective Purification of Recombinant Neuroactive Peptides using the Flagellar Type III Secretion System. *MBIO.* 3(3).
- Steiner, A.M., Woycechowsky, K.J., Olivera, B.M. and Bulaj, G. (2012) Reagentless Oxidative Folding of Disulfide-Rich Peptides is Catalyzed by an Intramolecular Diselenide**. *Angewandte Chemie.* 51(23):5580-4.
- Teichert RW, Smith NJ, Raghuraman S, Yoshikami D, Light AR, Olivera BM, (2012) Functional profiling of neurons through cellular neuropharmacology. *PNAS.* 109(5): 1388-95. PMID: PMC3277115
- Teichert RW, Raghuraman S, Memon T, Cox JL, Foulkes T, Rivier JE, Olivera BM, (2012) Characterization of two neuronal subclasses through constellation pharmacology. *PNAS.* 109(31):12758-63. PMID: PMC3411979
- 2013
- Aguilar MB, Zugasti-Cruz A, Falcón A, Batista CV, Olivera BM, de la Cotera EP. (2013) A novel arrangement of Cys residues in a paralytic peptide of *Conus cancellatus* (jr. syn.: *Conus austini*), a worm-hunting snail from the Gulf of Mexico. *Peptides* 41:38-44 PMID: 23474143
- Kuang Z, Zhang MM, Gupta K, Gajewiak J, Gulyas J, Balaram P, Rivier JE, Olivera BM, Yoshikami D, Bulaj G, Norton RS. (2013) Mammalian Neuronal Sodium Channel Blocker μ -Conotoxin BuIIIB Has a Structured N-Terminus That Influences Potency. *ACS Chem Biol.* 8(6):1344-51. PMID: 23557677 [PubMed - in process]
- Lin Z, Torres JP, Ammon MA, Marett L, Teichert RW, Reilly CA, Kwan JC, Huguen RW, Flores M, Tianero MD, Peraud O, Cox JE, Light AR, Villaraza AJ, Haygood MG, Concepcion GP, Olivera BM, Schmidt EW. (2013) A bacterial source for mollusk pyrone polyketides. *Chem Biol.* 20(1):73-81. PMID: 23352141.
- Lin Z, Marett L, Huguen RW, Flores M, Forteza I, Ammon MA, Concepcion GP, Espino S, Olivera BM, Rosenberg G, Haygood MG, Light AR, Schmidt EW (2013) Neuroactive diol and acyloin metabolites from cone snail-associated bacteria. *Bioorg Med Chem Lett.* 23(17):4867-9.
- Olivera, B.M., Imperial, J., and Concepcion, G.P., (2013). Snail Peptides, in: *Handbook of Biologically Active Peptides: Venom Peptides.* (A.J. Kastin, ed.), Elsevier, pp. 437-450.
- Smith, N., Hone, A.J., Memon, T., Bossi, S., Smith, T.E., McIntosh, J.M., Olivera, B.M., Teichert, R.W. (2013) Comparative functional expression of nAChR subtypes in rodent DRG neurons. *Frontiers in Cellular Neuroscience.* 7(225): 1-11.
- Ul-Hasan S, Burgess DM, Gajewiak J, Li Q, Hu H, Yandell M, Olivera BM, Bandyopadhyay PK. (2013) Characterization of the peptidylglycine α -amidating monooxygenase (PAM) from the venom ducts of neogastropods, *Conus bullatus* and *Conus geographus*. *Toxicon.* 74:215-24.
- Zhang MM, Wilson MJ, Azam L, Gajewiak J, Rivier JE, Bulaj G, Olivera BM, Yoshikami D. (2013) Co-expression of Na(V) β -subunits Alters The Kinetics of Inhibition of Voltage-gated Sodium Channels by Pore-blocking μ -Conotoxins. *Br J Pharmacol.* 168(7):1597-610.

Zhang MM, Wilson MJ, Gajewiak J, Rivier JE, Bulaj G, Olivera BM, Yoshikami D. (2013) Pharmacological fractionation of tetrodotoxin-sensitive sodium currents in rat dorsal root ganglion neurons by μ -conotoxins. *Br J Pharmacol.*169(1).

2014

Gajewiak J, Azam L, Imperial JS, Walewska A, Green BR, Bandyopadhyay PK, Raghuraman S, Ueberheide BM, Bern M, Zhou HM, Minassian NA, Hagan RH, Flinspach M, Liu Y, Bulaj G, Wickenden AD, Olivera BM, Yoshikami D, Zhang MM. (2014) A disulfide tether stabilizes the block of sodium channels by the novel conotoxin, μ 08GVIII. *PNAS USA*, 111(7):2758-63.

Gilchrist J, Olivera BM, Bosmans F. (2014) Animal toxins influence voltage-gated sodium channel function. *Handb Exp Pharmacol.* 221:203-29.

Green BR, Zhang MM, Chhabra S, Robinson SD, Wilson MJ, Redding A, Olivera BM, Yoshikami D, Bulaj G, Norton RS. (2014) Interactions of disulfide-deficient selenocysteine analogs of μ -conotoxin BuIIIB with the α -subunit of the voltage-gated sodium channel subtype 1.3. *FEBS J.* 281(13):2885-98.

Imperial, J., Cabang, A.B., Song, J.H., Raghuraman, S., Gajewiak, J., Watkins, M., Showers Corneli, P., Fedosov, A., Concepcion, G.P., H., T., and Olivera, B.M. (2014) A Family of Excitatory Peptide Toxins from Venomous Crassispirine Snails: Using Constellation Pharmacology to Assess Bioactivity. *Toxicon.* 2;89C:45-54.

Lin Z, Koch M, Pond CD, Mabeza G, Seronay RA, Concepcion GP, Barrows LR, Olivera BM, Schmidt EW. (2014) Structure and activity of lobophorins from a turrid mollusk-associated *Streptomyces* sp. *J Antibiot* (Tokyo). 67(1):121-6.

Lin Z, Zachariah MM, Marett L, Hughen RW, Teichert RW, Concepcion GP, Haygood MG, Olivera BM, Light AR, Schmidt EW. (2014) Griseorhodins D-F, Neuroactive Intermediates and End Products of Post-PKS Tailoring Modification in Griseorhodin Biosynthesis. *J Nat Prod.* 23;77(5):1224-30.

Olivera, B.M., Showers Corneli, P., Watkins, M., and Fedosov, A. (2014). Biodiversity of Cone Snails and other Venomous Marine Gastropods: Evolutionary Success Through Neuropharmacology., *Annual Review of Animal Biosciences* 2:487 -513.

Platt, R.J., Curtice, K.J., Twede, V.D., Watkins, M., Gruszczynski, P., Bulaj, G., Horvath, M.P., and Olivera, B.M., (2014) From molecular phylogeny towards differentiating pharmacology for NMDA receptor subtypes., *Toxicon* (81):67-79.

Puillandre, N.; Bouchet, P.; Duda, T. F., Jr.; Kaufenstein, S.; Kohn, A. J.; Olivera, B. M.; Watkins, M.; Meyer, C. (2014) Molecular phylogeny and evolution of the cone snails (Gastropoda, Conoidea). *Mol Phylogenet Evol*, 78, 290-303.

Raghuraman, S., Garcia, A., III, Anderson, T., Twede, V., Curtice, K.J., Ramirez, J.-M., Olivera, B.M., and Teichert, R.W. (2014) Defining modulatory inputs into CNS neuronal subclasses through functional pharmacological profiling, *PNAS* 111(17):6449-54.

Safavi-Hemami H, Hu H, Gorasia DG, Bandyopadhyay PK, Veith PD, Reynolds EC, Yandell M, Olivera BM and Purcell AW. (2014) Combined proteomic and transcriptomic interrogation of the venom gland of *Conus geographus* uncovers novel components and functional compartmentalization. *Journal of Molecular and Cellular Proteomics.* 13(4):938-53.

Teichert RW, Memon T, Aman JW, Olivera BM. (2014) Using Constellation Pharmacology to define comprehensively a somatosensory neuronal subclass. *PNAS USA*, 111(6):2319-24.

2015

Aman, J. W., J. S. Imperial, B. Ueberheide, M. M. Zhang, M. Aguilar, D. Taylor, M. Watkins, D. Yoshikami, P. Showers-Corneli, H. Safavi-Hemami, J. Biggs, R. W. Teichert, and B. M. Olivera. (2015) Insights into the origins of fish hunting in venomous cone snails from studies of *Conus tessulatus*. *Proc Natl Acad Sci U S A.*112(16):5087-92.

Barghi, N., G. P. Concepcion, B. M. Olivera, and A. O. Lluisma. (2015) High conopeptide diversity in *Conus tribblei* revealed through analysis of venom duct transcriptome using two high-throughput sequencing platforms. *Mar Biotechnol* (NY) 17:81-98.

Barghi N, Concepcion GP, Olivera BM, Lluisma AO. (2015) Comparison of the Venom Peptides and Their Expression in Closely Related *Conus* Species: Insights into Adaptive Post-speciation Evolution of *Conus* Exogenomes. *Genome Biol Evol.* 7(6):1797-814.

Christensen SB, Bandyopadhyay PK, Olivera BM, McIntosh JM. (2015) α S-conotoxin GVIIIB potently and selectively blocks α 9 α 10 nicotinic acetylcholine receptors. *Biochem Pharmacol.* 96(4):349-56.

Kalia, J., M. Milescu, J. Salvatierra, J. Wagner, J. K. Klint, G. F. King, B. M. Olivera, and F. Bosmans. (2015) From foe to friend: using animal toxins to investigate ion channel function. *J Mol Biol* 427:158-175.

Lee, H. K., L. Zhang, M. D. Smith, A. Walewska, N. A. Vellore, R. Baron, J. M. McIntosh, H. S. White, B. M. Olivera, and G. Bulaj. (2015) A marine analgesic peptide, Contulakin-G, and neurotensin are distinct agonists for neurotensin receptors: uncovering structural determinants of desensitization properties. *Front Pharmacol* 6:11.

Neves JL, Lin Z, Imperial JS, Antunes A, Vasconcelos V, Olivera BM, Schmidt EW. (2015) Small Molecules in the Cone Snail Arsenal. *Org Lett.* 17(20):4933-5.

Olivera BM, Seger J, Horvath MP, Fedosov AE. (2015) Prey-Capture Strategies of Fish-Hunting Cone Snails: Behavior, Neurobiology and Evolution. *Brain Behav Evol.* 86(1):58-74.

Puillandre, N.; Duda, T. F., Jr.; Meyer, C. P.; Olivera, B. M.; Bouchet, P. (2015) One, Four or 100 Genera? Classification of the Cone Snails. *J. Molluscan Studies* 801(1):1-23.

Robinson, S. D., H. Safavi-Hemami, S. Raghuraman, J. S. Imperial, A. T. Papenfuss, R. W. Teichert, A. W. Purcell, B. M. Olivera, and R. S. Norton. (2015) Discovery by proteogenomics and characterization of an RF-amide neuropeptide from cone snail venom. *J Proteomics* 114:38-47.

- Safavi-Hemami, H.; Gajewiak, J.; Karanth, S.; Robinson, S. D.; Ueberheide, B.; Douglass, A. D.; Schlegel, A.; Imperial, J. S.; Watkins, M.; Bandyopadhyay, P. K.; Yandell, M.; Li, Q.; Purcell, A. W.; Norton, R. S.; Ellgaard, L.; Olivera, B. M. (2015) Specialized insulin is used for chemical warfare by fish-hunting cone snails. *Proc Natl Acad Sci U S A*, 112, (6), 1743-8.
- Teichert, R. W.; Olivera, B. M.; McIntosh, J. M.; Bulaj, G.; Horvath, M. P. (2015) The Molecular Diversity of Conoidean Venom Peptides and their Targets: From Basic Research to Therapeutic Applications In *Venom to Drugs: Venom as a Source for the Development of Human Therapeutics*. King, G. F., Ed. RSC Publishing: London, Vol. RSC Drug Discovery, pp 163-203.
- Teichert, R. W.; Schmidt, E. W.; Olivera, B. M., (2015) Constellation Pharmacology: A new paradigm for drug discovery. *Ann. Rev. Pharmacology and Toxicology*, (55)573-589.
- Wilson, M. J., M. M. Zhang, J. Gajewiak, L. Azam, J. E. Rivier, B. M. Olivera, and D. Yoshikami. (2015) α - And β -subunit composition of voltage-gated sodium channels investigated with μ -conotoxins and the recently discovered μ O δ -conotoxin GVIII. *J Neurophysiol* 113(7):2289-2301.
- Zhang MM, Gajewiak J, Azam L, Bulaj G, Olivera BM, Yoshikami D. (2015) Probing the Redox States of Sodium Channel Cysteines at the Binding Site of μ O δ -Conotoxin GVIII. *Biochemistry*. 54(25):3911-20.

2016

- Barghi N, Concepcion GP, Olivera BM, Lluisma AO. (2016) Structural features of conopeptide genes inferred from partial sequences of the *Conus tribblei* genome. *Mol Genet Genomics*. 291(1):411-22.
- Barghi N, Concepcion GP, Olivera BM, Lluisma AO. (2016) Characterization of the complete mitochondrial genome of *Conus tribblei* Walls, 1977. *Mitochondrial DNA*. 27(6):4451-4452
- Curtice KJ, Leavitt LS, Chase K, Raghuraman S, Horvath MP, Olivera BM, Teichert RW. (2016) Classifying neuronal subclasses of the cerebellum through constellation pharmacology. *J Neurophysiol*. 115(2):1031-42.
- Espino, S. S., Dilanyan, T., Imperial, J. S., Aguilar, M. B., Teichert, R. W., Bandyopadhyay, P., Olivera, B. M. (2016) Glycine-rich Conotoxins from the *Virgiconus* Clade. *Toxicon* 113:11-17.
- Green BR, Gajewiak J, Chhabra S, Skalicky JJ, Zhang MM, Rivier JE, Bulaj G, Olivera BM, Yoshikami D, Norton RS. (2016) Structural Basis for the Inhibition of Voltage-gated Sodium Channels by Conotoxin μ O δ -GVIII. *J Biol Chem*. 291(13):7205-20.
- Green BR & Olivera BM. (2016) Venom Peptides from Cone Snails: Pharmacological Probes for Voltage-gated Sodium Channels. In R. French, S. Noskov *CTM 78 Na Channels Across Phyla and Function*. Chennai, India: Elsevier. 78:65-86.
- Menting J.F., Gajewiak J., MacRaild C.A., Chou D.H., Smith N.A., Miller C., Erchegey J., Rivier J.E., Olivera B.M., Forbes B.E., Smith B.J., Norton, R.S., Safami-Hemami H., Lawrence M.C. (2016) A minimized human insulin receptor binding motif displayed by a venom insulin. *NSMB*. 23(10):916-920.
- Safavi-Hemami H, Li Q, Jackson RL, Song AS, Boomsma W, Bandyopadhyay PK, Gruber CW, Purcell AW, Yandell M, Olivera BM, Ellgaard L. (2016) Rapid expansion of the protein disulfide isomerase gene family facilitates the folding of venom peptides. *Proc Natl Acad Sci U S A*. 113(12):3227-32.
- Safavi-Hemami H, Lu A, Li Q, Fedosov AE, Biggs J, Showers Corneli P, Seger J, Yandell M, Olivera BM. (2016) Venom Insulins of Cone Snails Diversify Rapidly and Track Prey Taxa. *Mol Biol Evol*. 33(11): 2924–2934.
- Tianero, M. D., Pierce, E., Raghuraman, S., Sardar, D., McIntosh, J. A., Heemstra, J. R., Schonrock, Z., Covington, B. C., Maschek, J. A., Cox, J. E., Bachmann, B. O., Olivera, B. M., Ruffner, D. E., Schmidt, E. W. (2016) Metabolic model for diversity-generating biosynthesis. *Proc Natl Acad Sci U S A*. 113(7):1772-7.

2017

- Drane SB, Robinson SD, MacRaild CA, Chhabra S, Chittoor B, Morales RA, Leung EW, Belgi A, Espino SS, Olivera BM, Robinson AJ, Chalmers DK, Norton RS. (2017) Structure and activity of contryphan-Vc2: Importance of the d-amino acid residue. *Toxicon*. 129:113-122.
- Li Q, Barghi N, Lu A, Fedosov AE, Bandyopadhyay PK, Lluisma AO, Concepcion GP, Yandell M, Olivera BM, Safavi-Hemami, H (2017) Divergence of the Venom Exogene Repertoire in Two Sister Species of *Turriconus*. *Genome Biol Evol*. 9(9):2211-2225.
- Lin Z, Smith MD, Concepcion GP, Haygood MG, Olivera BM, Light A, Schmidt EW. (2017) Modulating the Serotonin Receptor Spectrum of Pulicatin Natural Products. *J Nat Prod*. 80(8):2360-2370.
- Memon T, Chase K, Leavitt LS, Olivera BM, Teichert RW. (2017) TRPA1 expression levels and excitability brake by KV channels influence cold sensitivity of TRPA1-expressing neurons. *Neuroscience*. 353:76-86.
- Olivera BM, Raghuraman S, Schmidt EW, Safavi-Hemami H. (2017) Linking neuroethology to the chemical biology of natural products: interactions between cone snails and their fish prey, a case study. *J Comp Physiol A Neuroethol Sens Neural Behav Physiol*. 203(9):717-735.
- Olivera BM, Fedosov A, Imperial JS, Kantor Y. (2017) Physiology of Envenomation by Conoidean Gastropods. In S.M. Saleuddin & S.T. Mukai (Eds.), *Physiology of Molluscs* (Ch. 5). Waretown, New Jersey: Apple Academic Press, Inc.
- Olivera, B.M., H. Safavi-Hemami, Raghuraman S., Teichert R.W. (2017) Cone Snail Venom Peptides and Future Biomedical Applications of Natural Products In *Chemical Biology of Natural Products*. Editors: Newman, Cragg.

- Omaga CA, Carpio LD, Imperial JS, Daly NL, Gajewiak J, Flores MS, Espino SS, Christensen S, Filchakova OM, López-Vera E, Raghuraman S, Olivera BM, Concepcion GP. (2017) Structure and Biological Activity of a Turriptide from *Unedogemmula bisaya* Venom. *Biochemistry*. 56(45):6051-6060.
- Robinson SD, Li Q, Lu A, Bandyopadhyay PK, Yandell M, Olivera BM, Safavi-Hemami H. (2017) The Venom Repertoire of *Conus gloriamaris* (Chemnitz, 1777), the Glory of the Sea. *Mar Drugs*. 15(5). pii: E145.
- Romero HK, Christensen SB, Di Cesare Mannelli L, Gajewiak J, Ramachandra R, Elmslie KS, Vetter DE, Ghelardini C, Iadonato SP, Mercado JL, Olivera BM, McIntosh JM. (2017) Inhibition of $\alpha 9\alpha 10$ nicotinic acetylcholine receptors prevents chemotherapy-induced neuropathic pain. *Proc Natl Acad Sci U S A*. 114(10):E1825-E1832.
- Torres JP, Tianero MD, Robes JMD, Kwan JC, Biggs JS, Concepcion GP, Olivera BM, Haygood MG, Schmidt EW. (2017) *Stenotrophomonas*-like bacteria are widespread symbionts in cone snail venom ducts. *Appl Environ Microbiol*. 83(23) pii: AEM.01418-17.

2018

- Cordeiro S, Finol-Urdaneta RK, Köpfer D, Markushina A, Song J, French RJ, Kopec W, de Groot BL, Giacobassi MJ, Leavitt LS, Raghuraman S, Teichert RW, Olivera BM, Terlau H. Conotoxin κ M-R111J, a tool targeting asymmetric heteromeric K1 channels. *Proceedings of the National Academy of Sciences of the United States of America*. PMID 30593566 DOI: 10.1073/Pnas.1813161116
- Espino SS, Robinson SD, Safavi-Hemami H, Gajewiak J, Yang W, Olivera BM, Liu Q. (2018) Conopeptides promote itch through human itch receptor hMgprX1. *Toxicon*. 154:28-34.
- O'Brien H, Kanemura S, Okumura M, Baskin RP, Bandyopadhyay PK, Olivera BM, Ellgaard L, Inaba K, Safavi-Hemami H. (2018) Ero1-Mediated Reoxidation of Protein Disulfide Isomerase Accelerates the Folding of Cone Snail Toxins. *Int J Mol Sci*. 19(11). pii: E3418.
- Safavi-Hemami H, Brogan SE, Olivera BM. Pain therapeutics from cone snail venoms: From Ziconotide to novel non-opioid pathways. *Journal of Proteomics*. PMID 29777871 DOI: 10.1016/j.jprot.2018.05.009

2019

- Ahorukomeye P, Disotuar MM, Gajewiak J, Karanth S, Watkins M, Robinson SD, Flórez Salcedo P, Smith NA, Smith BJ, Schlegel A, Forbes BE, Olivera B, Hung-Chieh Chou D, Safavi-Hemami H. (2019) Fish-hunting cone snail venoms are a rich source of minimized ligands of the vertebrate insulin receptor. *Elife*. 8. pii: e41574.
- Cordeiro, S; Finol-Urdaneta, R; Köpfer, D; Markushina, A; Song, J; French, R; Kopec, W; de Groot, B; Giacobassi, M; Leavitt, L; Raghuraman, S; Teichert, R; Olivera, BM; Terlau, H. (2019) Conotoxin κ M-R111J, a new tool targeting asymmetric heteromeric K1 channels. *Proc Natl Acad Sci U S A*. 116(3):1059-1064.
- Cruz LJ, Ramilo CA, Corpuz GP, Olivera BM. Conus Peptides: Phylogenetic Range of Biological Activity. *The Biological Bulletin*. 183: 159-164. PMID 29304567 DOI: 10.2307/1542418
- Kjelgaard, L.D., Foged, M.M., Albert, A., Bertelsen, A.B., Søltoft, C.L., Robinson, S.D., Petersen, S.V., Purcell, A.W., Olivera, B.M., Norton, R.S., Vasskog, T., Safavi, H., Teilum, K. and Ellgaard, L. (2019) The three-dimensional structure of an H-superfamily conotoxin reveals a granulin fold arising from a common ICK cysteine framework. *The Journal of Biological Chemistry*. 294(22): 874-8759.
- McIntosh JM, Romero H, Christensen S, Dowell C, Iadonato S, Mercado J, Olivera BM. α -conotoxin RgIA analogs and the treatment of neuropathic pain *Toxicon*. 158: S9. DOI: 10.1016/J.Toxicon.2018.10.039
- Memon T, Yarishkin O, Reilly CA, Krizaj D, Olivera BM, Teichert RW. (2019) trans-Anethole of Fennel Oil is a Selective and Nonelectrophilic Agonist of the TRPA1 Ion Channel. *Mol Pharmacol*. 95(4):433-441.
- Neves JLB, Imperial JS, Morgenstern D, Ueberheide B, Gajewiak J, Antunes A, Robinson SD, Espino S, Watkins M, Vasconcelos V, Olivera BM. (2019) Characterization of the First Conotoxin from *Conus ateralbus*, a Vermivorous Cone Snail from the Cabo Verde Archipelago. *Mar Drugs*. 17(8). pii: E432. doi: 10.3390/md17080432.
- Nielsen LD, Foged MM, Albert A, Bertelsen AB, Søltoft CL, Robinson SD, Petersen SV, Purcell AW, Olivera BM, Norton RS, Vasskog T, Safavi-Hemami H, Teilum K, Ellgaard L. (2019) The three-dimensional structure of an H-superfamily conotoxin reveals a granulin fold arising from a common ICK cysteine framework. *J Biol Chem*. 294(22):8745-8759. doi: 10.1074/jbc.RA119.007491. Epub 2019 Apr 11.
- Olivera BM. Linking venoms to behavior: Fish-hunting cone snails, a case study *Toxicon*. 158. DOI: 10.1016/J.Toxicon.2018.10.116
- Safavi-Hemami H, Brogan SE, Olivera BM. (2019) Pain therapeutics from cone snail venoms: From Ziconotide to novel non-opioid pathways. *J Proteomics*. 190:12-20.
- van Hout M, Valdes A, Christensen SB, Tran PT, Watkins M, Gajewiak J, Jensen AA, Olivera BM, McIntosh JM. (2019) α -Conotoxin Vn1B from *Conus ventricosus* is a potent and selective antagonist of $\alpha 6\beta 4^*$ nicotinic acetylcholine receptors. *Neuropharmacology*. 157:107691. doi: 10.1016/j.neuropharm.2019.107691. Epub 2019 Jun 28.

2020

- Bjørn-Yoshimoto WE, Ramiro IBL, Yandell M, McIntosh JM, Olivera BM, Ellgaard L, Safavi-Hemami H. Curses or Cures: A Review of the Numerous Benefits Versus the Biosecurity Concerns of Conotoxin Research. *Biomedicines*. 8. PMID 32708023 DOI: 10.3390/Biomedicines8080235
- Chua VM, Gajewiak J, Watkins M, Espino SS, Ramiro IBL, Omaga CA, Imperial JS, Carpio LPD, Fedosov A, Safavi-Hemami H, Salvador-Reyes LA, Olivera BM, Concepcion GP. Purification and Characterization of the Pink-Floyd Drillipeptide, a

- Bioactive Venom Peptide from *Clavus davidgilmouri* (Gastropoda: Conoidea: Drilliidae). *Toxins* (Basel). 2020 Aug 7;12(8):508. doi: 10.3390/toxins12080508. PMID: 32784699; PMCID: PMC7472735.
- Giacobassi MJ, Leavitt LS, Raghuraman S, Alluri R, Chase K, Finol-Urdaneta RK, Terlau H, Teichert RW, Olivera BM. (2020) An integrative approach to the facile functional classification of dorsal root ganglion neuronal subclasses. *Proc Natl Acad Sci U S A*. 17 (10) 5494-5501.
- Inagaki RT, Raghuraman S, Chase K, Steele T, Zornik E, Olivera BM, Yamaguchi A. Molecular characterization of frog vocal neurons using constellation pharmacology. *Journal of Neurophysiology*. PMID 32374212 DOI: 10.1152/Jn.00105.2020
- Lu, A., Watkins, M., Li, Q., Robinson, S. D., Concepcion, G. P., Yandell, M., Weng, Z., Olivera, B. M., Safavi, H. & Fedosov, A. E. (2020), *Genome Biology and Evolution*. 12 (5): 684-700.
- Raghuraman, S., Xie JY, Giacobassi MJ, Tun JO, Chase K, Lu D, Teichert RW, Porreca F, Olivera BM. Chronicling changes in the somatosensory neurons after peripheral nerve injury. *Proceedings of the National Academy of Sciences of the United States of America*. PMID 33020310 DOI: 10.1073/pnas.1922618117
- Rybin MJ, O'Brien H, Ramiro IBL, Azam L, McIntosh JM, Olivera BM, Safavi-Hemami H, Yoshikami D. α M-Conotoxin MIIIJ Blocks Nicotinic Acetylcholine Receptors at Neuromuscular Junctions of Frog and Fish. *Toxins*. 12. PMID 32245200 DOI: 10.3390/toxins12030197
- Torres, J.P., Lin, Z., Fenton, D.S., Leavitt, L.U., Niu, C., Lam, P.Y., Robes, J.M., Peterson, R.T., Concepcion, G.P., Haygood, M.G., Olivera, B.M., Schmidt, E.W. (2020). Boholamide A, and APD-Class, Hypoxia-Selective Cyclopeptide. *J. Nat Prod*. 83(4):1249-1257.
- Wozniak CE, Hendriksen JJ, Olivera BM, Roth JR, Hughes KT. Integration of the pSLT plasmid into the chromosome results in a temperature-sensitive growth defect due to aberrant DNA replication. *Journal of Bacteriology*. PMID 32747428 DOI: 10.1128/Jb.00380-20
- Xiong, S., Menting, J.G., Disotuar, M.M., Smith, N.A., Delaine, C.A., Ghabash, G., Agrawal, R., Wang, X., He, X., Fisher, S.J., MacRaild, C.A., Norton, R.S., Gajewiak, J., Forbes, B.E., Smith, B.J., Safavi, ., Olivera, B., Lawrence, M.C. and Chou, D.H.C. (2020) A structurally minimized yet fully active insulin based on cone-snail venom insulin principles. *Nature Structural and Molecular Biology*. 27:615-624.
- 2021
- Bosse GD, Urcino C, Watkins M, Flerez Salcedo P, Kozel S, Chase K, Cabang A, Espino SS, Safavi-Hemami H, Raghuraman S, Olivera BM, Peterson RT, Gajewiak J. (2021) Discovery of a Potent Conorfamide from *Conus episcopatus* Using a Novel Zebrafish Larvae Assay. *J Nat Prod* 84(4):1232-1243.
- Gajewiak J, Christensen SB, Dowell C, Hararah F, Fisher F, Huynh PN, Olivera BM, McIntosh JM. Selective Penicillamine Substitution Enables Development of a Potent Analgesic Peptide that Acts through a Non-Opioid-Based Mechanism. *Journal of Medicinal Chemistry*. PMID 34142837 DOI: 10.1021/acs.jmedchem.1c00512
- Jergova S, Perez C, Imperial JS, Gajavelli S, Jain A, Abin A, Olivera BM, Sagen J. (2021) Cannabinoid receptor agonists from *Conus* venoms alleviate pain-related behavior in rats. *Pharmacol Biochem Behav*. 205:173182. doi: 10.1016/j.pbb.2021.173182. Online ahead of print.
- Niu C, Leavitt LS, Lin Z, Paguigan ND, Sun L, Zhang J, Torres JP, Raghuraman S, Chase K, Cadeddu R, Karthikeyan M, Bortolato M, Reilly CA, Hughen RW, Light AR, Olivera BM, Schmidt EW. (2021) Neuroactive Type-A γ -Aminobutyric Acid Receptor Allosteric Modulator Steroids from the Hypobranchial Gland of Marine Mollusk, *Conus geographus*. *J Med Chem*. doi: 10.1021/acs.jmedchem.1c00562. Online ahead of print.
- Lin Z, Torres JP, Watkins M, Paguigan N, Niu C, Imperial JS, Tun J, Safavi-Hemami H, Finol-Urdaneta RK, Neves JLB, Espino S, Karthikeyan M, Olivera BM, Schmidt EW. Non-Peptidic Small Molecule Components from Cone Snail Venoms. *Frontiers in Pharmacology*. 12: 655981. PMID 34054536 DOI: 10.3389/fphar.2021.655981
- Martin L, Ibrahim M, Gomez K, Yu J, Cai S, Chew LA, Bellampalli SS, Moutal A, Largent-Milnes T, Porreca F, Khanna R, Olivera BM, Patwardhan A. Conotoxin contulakin-G engages a neurotensin receptor 2 /R-type calcium channel (Cav2.3) pathway to mediate spinal antinociception. *Pain*. 2021 Dec 15. doi: 10.1097/j.pain.0000000000002561. Epub ahead of print. PMID: 35050960.
- Olivera BM. A Serendipitous Path to Pharmacology. *Annu Rev Pharmacol Toxicol*. 2021 Jan 6;61:9-23. doi: 10.1146/annurev-pharmtox-030320-113510. PMID: 33411581.
- Niu C, Leavitt LS, Lin Z, Paguigan ND, Sun L, Zhang J, Torres JP, Raghuraman S, Chase K, Cadeddu R, Karthikeyan M, Bortolato M, Reilly CA, Hughen RW, Light AR, ... Olivera BM, et al. Neuroactive Type-A γ -Aminobutyric Acid Receptor Allosteric Modulator Steroids from the Hypobranchial Gland of Marine Mollusk. *Journal of Medicinal Chemistry*. PMID 33949869 DOI: 10.1021/acs.jmedchem.1c00562
- Paguigan ND, Yan Y, Karthikeyan M, Chase K, Carter J, Leavitt LS, Lim AL, Lin Z, Memon T, Christensen S, Bentzen BH, Schmitt N, Reilly CA, Teichert RW, Raghuraman S, ... Olivera BM, et al. The Tunicate Metabolite 2-(3,5-Diiodo-4-methoxyphenyl)ethan-1-amine Targets Ion Channels of Vertebrate Sensory Neurons. *Acs Chemical Biology*. PMID 34423964 DOI: 10.1021/acscchembio.1c00328
- Paguigan ND, Tun JO, Leavitt LS, Lin Z, Chase K, Dowell C, Deering-Rice CE, Lim AL, Karthikeyan M, Hughen RW, Zhang J, Peterson RT, Reilly CA, Light AR, Raghuraman S, ... Olivera BM, et al. Nicotinic Acetylcholine Receptor Partial

Antagonist Polyamides from Tunicates and Their Predatory Sea Slugs. *Acs Chemical Neuroscience*.

PMID 34213884 DOI: 10.1021/acscchemneuro.1c00345

Torres J.P., Lin Z., Watkins M., Florez-Salcedo P., Baskin R. P., Elhabian S., Safavi-Hemami H., Taylor D., Tun J., Saguil N., Fang Y., McArthur J.R., Tae H-S, Finol-Urdaneta R.K., Duygu zpolat B., Olivera B.M., Schmidt E.W. (2021) Small molecule mimicry hunting strategy in the Imperial cone snail, *Conus imperialis*. *Science Advances*. 7(11):eabf2704.

Zhenjian L, Torres J.P., Watkins M., Paguigan N., Niu C., Imperial J.S., Tun J., Safavi-Hemami H., Finol-Urdaneta R.K., Neves J.L.B., EspinoS., Karthikeyan M., Olivera B.M., Schmidt E.W. (2021) Non-Peptidic Small Molecule Components from Cone Snail Venoms. *Front. Pharmacol.*, 13 May 2021 <https://doi.org/10.3389/fphar.2021.655981>.

2022

Ramiro, I.B.L. et al., (2022) Somatostatin venom analogs evolved by fish-hunting cone snails: from prey capture behavior to identifying drug leads. *Science Advances*. (in Press).

Grants

R01 GM122869 04/01/2018-02/28/2023

NIH

“Life history-guided drug discovery from venomous marine snails.”

Role: Co-PI

The goal of this work is to do a transcriptomic and proteomic analysis of cone snail venoms for discovery.

Patents (50 Total)

<u>Patent No.</u>	<u>Issue Date</u>	<u>App Type</u>	<u>Title</u>
5,885,780	3/23/99	Parent/Utility	Method of Obtaining Small Conformationally Rigid Conopeptides
1123109	9/24/03	European Patent Council [EPC]	Contulakin-G, Analogs Thereof and Uses Therefor
69911632.5	9/24/03	European Patent Council [EPC]	Contulakin-G, Analogs Thereof and Uses Therefor
1123109	9/24/03	European Patent Council [EPC]	Contulakin-G, Analogs Thereof and Uses Therefor
1123109	9/24/03	Nationalized PCT"	Contulakin-G, Analogs Thereof and Uses Therefor
2,347,713	7/13/10	Nationalized PCT	Contulakin-G, Analogs Thereof and Uses Therefor
1123109	9/24/03	European Patent Council [EPC]	"Contulakin-G, Analogs Thereof and Uses Therefor
1123109	9/24/03	European Patent Council [EPC]	"Contulakin-G, Analogs Thereof and Uses Therefor
766294	2/12/04	Nationalized PCT	Contulakin-G, Analogs Thereof and Uses Therefor"
5,672,682	9/30/97	Parent/Utility	Conotoxin Peptide PVIIA
3953110	5/11/07	Nationalized PCT	Conotoxin Peptide PVIIA
6,515,103	2/4/03	Nationalized PCT-US	Conantokins
5,866,682	2/2/99	Parent/Utility	Conotoxin Peptides AuIA, AuIB and AuIC
6,441,132	8/27/02	Nationalized PCT-US	Contryphan Peptides
5,889,147	3/30/99	Parent/Utility	Bromo-Tryptophan Conopeptides
6,624,288	9/23/03	Parent/Utility	Gamma-Conopeptides
5,922,679	7/13/99	Divisional [DIV]	Use of Alpha-Conotoxin MII to Treat Disorders Resulting from Nicotine-Stimulated Dopamine Release
5,780,433	7/14/98	Parent/Utility	Use of Alpha-Conotoxin MII to Treat Disorders Resulting from Nicotine-Stimulated Dopamine Release
5,929,034	7/27/99	Divisional [DIV]	Use of Alpha-Conotoxin MII to Treat Disorders Resulting from Nicotine-Stimulated Dopamine Release
6,265,541	7/24/01	Parent/Utility	Uses of Alpha-Conotoxin Peptides
6,958,323	10/25/05	Divisional [DIV]	Uses of Alpha-Conotoxin Peptides
6,696,408	2/24/04	Divisional [DIV]	Contulakin-G, Analogs Thereof and Uses Therefor
6,344,551	2/5/02	Divisional [DIV]	Contulakin-G, Analogs Thereof and Uses Therefor
6,369,193	4/9/02	Parent/Utility	Contulakin-G, Analogs Thereof and Uses Therefor
6,268,473	7/31/01	Parent/Utility	Alpha-Conotoxin Peptides
6,855,805	2/15/05	Continuation-in-Part [CIP]	Alpha-Conotoxin Peptides
778353	3/24/05	Nationalized PCT	Alpha-Conotoxin Peptides
7,279,549	10/9/07	Divisional [DIV]	Alpha-Conotoxin Peptides
6,797,808	9/28/04	Parent/Utility	Alpha-Conotoxin Peptides
8,110,549	2/7/12	Divisional [DIV]	Alpha-Conotoxin Peptides
7,666,840	2/23/10	Divisional [DIV]	Alpha-Conotoxin Peptides
7,368,432	5/6/08	Divisional [DIV]	Conotoxin Peptides
8,735,541	5/27/14	Divisional [DIV]	Alpha-Conotoxin Peptides
2,361,534	8/30/11	Nationalized PCT	Alpha-Conotoxin Peptides
7,902,153	3/8/11	Divisional [DIV]	Alpha-Conotoxin Peptides
8,487,075	7/16/13	Divisional [DIV]	Alpha-Conotoxin Peptides
770076	5/27/04	Nationalized PCT	Alpha-Conotoxin Peptides
6,767,896	7/27/04	Continuation-in-Part [CIP]	Alpha-Conotoxin Peptides
6,172,041	1/9/01	Continuation [CN]	Use of Conantokins
7,390,785	6/24/08	Continuation [CN]	Tau-Conotoxin Peptides
6,630,573	10/7/03	Parent/Utility	Tau-Conotoxin Peptides
6,077,934	6/20/00	Parent/Utility	Contryphan Peptides
6,153,738	11/28/00	Divisional [DIV]	Contryphan Peptides
6,762,165	7/13/04	Parent/Utility	O-Superfamily Conotoxin Peptides
7,115,708	10/3/06	Continuation [CN]	B-Superfamily Conotoxins
6,727,226	4/27/04	Parent/Utility	Mu-Conopeptides
7,238,513	7/3/07	Continuation [CN]	Conus Protein Disulfide Isomerase
9,062,118	6/23/15	Nationalized PCT-US	J-SuperFamily Conotoxin Peptides
5558817		Nationalized PCT	Methods for Treating Pain and Screening Analgesic Compounds
2007275764	2/27/14	Nationalized PCT	Methods for Treating Pain and Screening Analgesic Compounds